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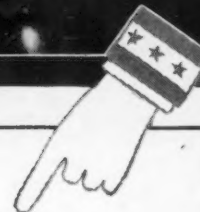
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# THE IRON AGE

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## Co-education in Economics

ONE of the improvements that might be suggested for America after the war business is co-education of our future managers and labor leaders in economic fundamentals.

The groundwork for this has been already established through the operation of labor-management committees in industry, many of which have worked out very successfully, not only towards the objective of helping to win the war but with an added promise that they may help us equally in winning the peace afterwards.

The idea back of this, of course, is cooperation on a common ground which recognizes that management and labor have more to gain by working together than by isolating themselves in antagonistic groups. And that while there will probably always be points on which management and labor will differ, it is not in the interest of either to let these differences obscure the more fundamental objectives on which there should be agreement and united action.

We are approaching a period in which management and labor should study their arithmetic from the same textbooks. Economic arithmetic. After burning up the equivalent of two whole years of national income, none of us can afford the past extravagance of believing that 2 and 2 either make 3 or 5.

Management, in the past, with some notable exceptions believed that 2 and 2 made 3 in connection with wage policy. It did not fully appreciate that wage money finances nearly 80 per cent of the purchasing power of this country and that to finance the consumption of mass production industry it had of necessity to manufacture customers with maximum possible purchasing power in addition to manufacturing goods for people to buy.

Labor, in the past, with equally notable exceptions, believed that 2 and 2 made 5. It overlooked the important fact that labor has also a responsibility for making maximum wages possible by striving to attain maximum productivity. It believed that the cost of living should determine wages, whereas the fact is that cost of living is determined by a partnership action by labor and management. Labor through increased productivity and thereby lower cost; management through price reductions on products provide the motivating factors that increase general purchasing power and reduce the cost of living.

Our future managers and labor leaders alike will largely be college graduates. It would be a good thing if they could go to school together, learn what the fundamentals are on which they can and should agree and how to settle that on which they cannot agree with the least possible friction.

*J. W. Van Dine*



## Make the "Slackers" Fight

One by one your friends have marched away to fight for America. They are brave men and you are proud of them. As each one has gone to the front, you have resolved anew to do all you can to help them defeat our enemies.

But have you stopped to think of the "slackers" that may be at your elbow—"slackers" that will fight for America only when you say the word? These "slackers" are the tons of potential scrap that have not been marked for quick removal and shipment to steel mills.

Hungry steel mill furnaces are cutting deeply into stocks of scrap. It is the "slacker" scrap that may be in and around your plant that can be moved regardless of weather. That is the scrap which will help steel mills produce at capacity.

Start today! Mark *scrap* on buildings, tanks, machinery, tools, dies, etc., that cannot be used either to win the war or win the peace.

Make the "slackers" fight!



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# Plastic Working of Magnesium Alloy Sheet

**T**HE methods employed for forming magnesium alloys differ from those used in the forming of most other metals in that all except the most simple operations must be done at elevated temperatures to obtain sufficient plasticity and elongation to allow the part to be formed or drawn. The effect of elevated temperatures on the tensile strength and elongation of annealed magnesium alloy sheet is shown in Fig. 1. The crystallographic form of magnesium is close-packed hexagonal, and at temperatures up to 400 deg. F. has only one set of slip planes (the basal planes), thereby definitely limiting the permitted deformation. Above 400 deg. to 450 deg. F. the pyramidal planes also become active, thereby greatly increasing the capacity for deformation.

Working metals at elevated temperatures and at speeds coincident with the re-crystallization rate has several advantages over cold working. The parts can often be formed in one operation without the necessity of drawing, annealing and re-drawing, thus reducing not only the time involved for making the part, but also eliminating the necessity of additional die equipment for deep drawn parts. Another advantage of the hot forming process is that the allowance for "springback" is not required. This results in simplified die design and the possibility of making parts identical should the material come to the presses in varying hardness.

At the present time, annealed magnesium alloy sheet, designated as Dowmetal Ma and Dowmetal J-1a, is being used for hot formed parts. Dowmetal J-1h (identical to Dowmetal J-1a, but in the hard condition) sheet is used for stressed parts and is formed at a temperature low enough

... While metallurgical development has contributed to a large extent to inducing confidence in the use of magnesium alloys in weight-saving applications, improved fabrication methods have kept pace with these developments. This article, which was presented at the 11th annual meeting of the Institute of the Aeronautical Sciences, discusses these methods as they apply to the forming of magnesium alloy sheet metal parts.

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By C. E. LEHNHARDT

*Dowmetal Fabrication Division, Dow Chemical Co., Bay City, Mich.*

o o o

to retain its hard-rolled mechanical properties. Table I shows the chemical composition and Table II, the mechanical properties of these magnesium alloys.

The annealed alloys, Dowmetal Ma and J-1a, lend themselves to hot forming operations because the physical properties noted above are inherent in the metal and are not affected by subsequent heating and cooling. Dow-

metal J-1h is somewhat more difficult to form because the temperature to which this material is heated will affect its mechanical properties after cooling. Working temperatures for Dowmetal J-1h should not be over 400 deg. F., while for Dowmetal Ma and J-1a, working temperatures as high as 700 deg. F. may be used. The effect of heating on the mechanical properties of hard-rolled magnesium

TABLE I  
Chemical Composition of Dowmetal Sheet  
(Nominal Composition, Per Cent)

Alloy	Aluminum	Manganese	Zinc	Magnesium
M		1.5		Remainder
J	6.5	0.2	0.7	Remainder

TABLE II  
Mechanical Properties of Dowmetal Sheet

Alloy	Tensile Yield Strength, Lb. Per Sq. In.	Ultimate Tensile Strength, Lb. Per Sq. In.	Elongation, Per Cent, In.
Ma	16,000	32,000	15
J-1a	24,000	42,000	16
J-1h	35,000	45,000	8

alloy sheet after it has cooled to room temperature is illustrated in Fig. 2.

### Equipment

**Presses:** Either a hydraulic press or a mechanical press, slowed down, may be used for drawing magnesium alloys. The hydraulic press has the advantage of controllable speed during the drawing operation. The press should be designed for both hand and automatic control, the hand control to be used when "inching" of the

In many cases a triple-action press will be found useful, especially where stripping action is desired. Single action presses can be used, but in many cases will require cumbersome spring installations for holding pressure; however, pneumatic cushions can usually be installed to overcome this handicap.

For light repetitive production work a 200-ton press with a lower cushion is suitable. If, however, extremely large parts are to be fabricated, or

square rubber retaining box. Platen size, open and shut heights of the press will be determined by the die requirements.

Inclinable mechanical presses are suitable for blanking and punching operations.

**Brakes and Bending Rolls:** Magnesium alloys may be bent in either the leaf-type or the press-type brake. The press-type brake is preferred because the leaf-type brake tends to concentrate the deformation at the

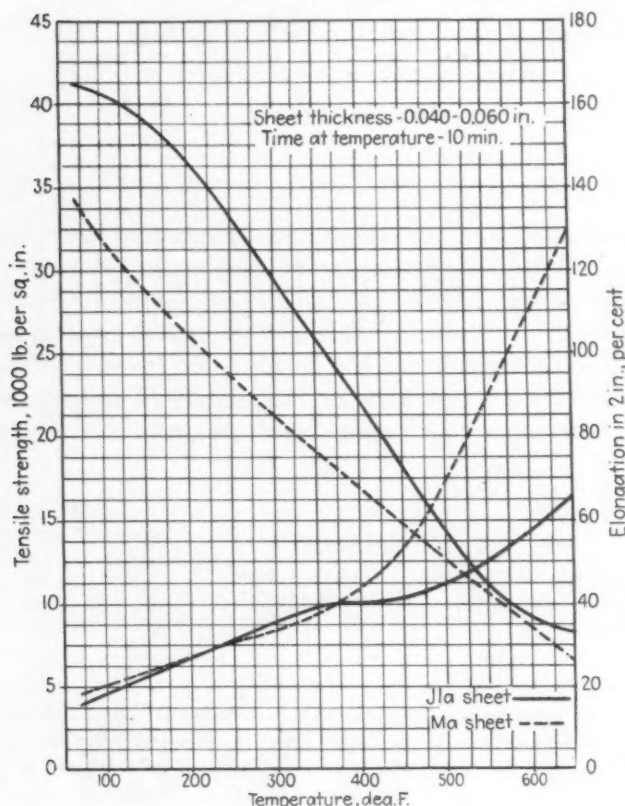


FIG. 1—The effect of elevated temperatures on the tensile strength and elongation of annealed magnesium alloy sheet.

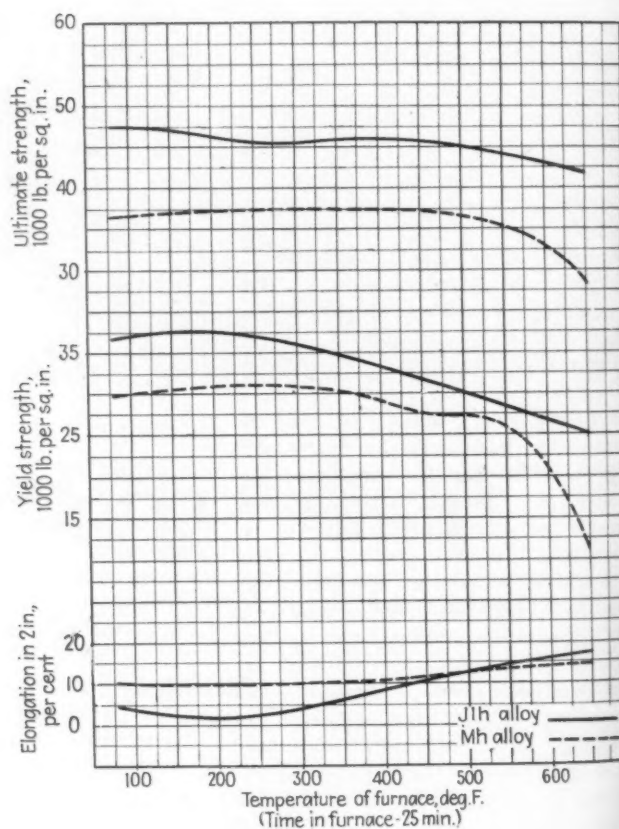


FIG. 2—Effect of heating on the mechanical properties of hard-rolled magnesium alloy sheet after it has cooled to room temperature.

ram is required as in delicate drawing operations or where extremely slow speeds are desirable; and the automatic, with a ram speed of 75 to 200 in. per min., for production operations. The size and capacity will depend largely upon the type of work to be handled and also upon such factors as material thickness and size and shape of the finished article.

It is desirable to have at least a double-acting press either with both rams operating upper platens or with one upper ram and a bottom cushion.

rubber forming (Guerin process\*, U. S. Patents Nos. 2,055,077, 2,133,445, and 2,190,659) is to be resorted to, a larger press will be indicated. The Guerin process using rubber made to

\* See THE IRON AGE, issues of June 4, June 11 and June 18, 1942 for additional data on this forming practice.

flow hydraulically in a confined area requires a pressure of about 1000 lb. per sq. in. Therefore, a 400-ton press will only accommodate about a 24-in.

clamping edge and cause fracture. It is also much easier, with the press-type brake, to provide heat as shown in Fig. 3. When this is done, care must be taken that heating the bending dies will not unduly strain the mechanism of the press. Ordinary bending rolls are suitable for rolling cylindrical magnesium sheet parts.

### Tools

**Blanking Tools:** Die design for blanking magnesium alloys differs only slightly from that used for blank-



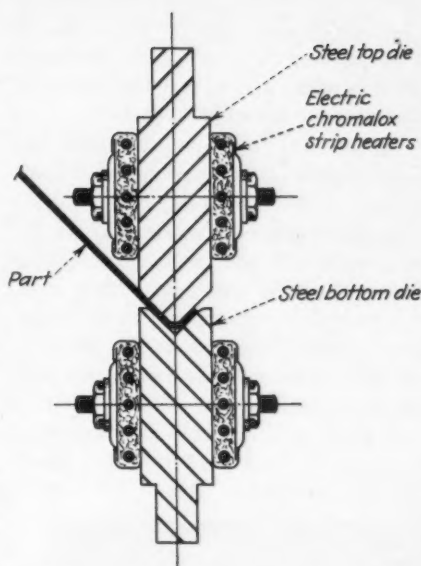
ing other metals such as steel, brass or aluminum. The main difference is in the close clearance required between the punch and the die. The die is usually made of hardened tool steel and the punch of tool steel left soft so that it can be sheared into the die. For short runs ordinary mild steel cyanide hardened dies and punches give excellent results. If dies and punches are to be hardened and ground, it is recommended that die clearance be held to 0.0015-in. to 0.002-in. in order to minimize the characteristic rough flaky fracture of a sheared magnesium edge. Another means of improving the sheared edge appearance is by machining a slight rake (3 deg. to 5 deg.) on the punch. Sheet shearing blades should also have a slight rake and should be set with as little clearance as possible.

**Drawing Dies & Die Design:** Drawing dies used for forming magnesium alloys do not differ greatly from those employed for forming other materials. The main difference is that provision must be made for heating.

Draw rings and pressure pads are generally made of mild steel, but should be annealed before final machining to relieve stresses. Tool steel may be used, but due to its higher initial cost, its use should be restricted to high production dies. Nitrided steels may prove advantageous in diminishing pickup. If, however, mild steel dies are highly polished and well lubricated, they will prove entirely satisfactory. Material thickness should be sufficient to withstand the holder pressure and to resist warpage at elevated temperatures.

The entering radius of the drawing edge should be from 4 to 15 times the sheet thickness depending upon the depth of draw, nature of the draw and size of the finished part. In general, a  $\frac{3}{8}$ -in. radius is satisfactory for 0.064-in. thick sheet. The influence of the radius upon the success of the draw is complicated by the fact that two definite but opposing factors are at work. The larger the radius, the less the friction and conversely the smaller the radius, the greater will be the bending strains as the metal is drawn over the die, making deep draws difficult. Large radii will increase the tendency of some draws to pucker.

The male die, or punch, may be made of steel, cast iron, aluminum or magnesium, either cast or in plate form. Aluminum or magnesium castings having the advantage of easy machinability. The punch radius should be as liberal as possible.



**FIG. 3—**In bending magnesium alloys in the press-type brake, care must be taken that heating the bending dies will not unduly strain the mechanism of the press. Shown here is the application of electrical heating elements to forming dies in this type brake.

The coefficient of thermal expansion of magnesium alloy is greater than that of steel. Roughly, steel expands one-third as much as magnesium. For this reason, steel dies must be made slightly oversize in order that the finished magnesium part will not be undersize. Therefore, in designing steel dies, all die dimensions should be multiplied by the factor 1.0040 if the dies are to be run at a temperature of 600 deg. F. Dimensions for aluminum dies are multiplied by the factor 1.0017. Magnesium alloy dies are made to the size of the finished part.

The clearance between the female

die and male punch should be at least equal to the metal thickness and for deep draws where considerable thickening is encountered, it should be sufficient to prevent binding.

Fig. 4 illustrates a steel draw ring and aluminum punch die designed to form 0.051-in. magnesium alloy sheet into a hemispherical tank head 13 in. in diameter.

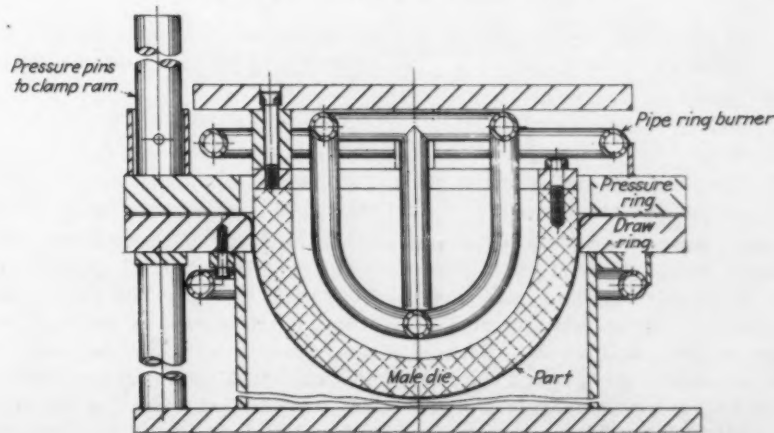
Forming dies are generally heated with gas fired burners automatically controlled. Sufficient burner capacity must be provided to maintain the desired temperature uniformly over the entire die surface. A standard type burner that has proved very satisfactory is made from  $\frac{3}{4}$ -in. or 1-in. standard pipe bent to the desired shape and drilled with No. 40 holes on  $\frac{1}{2}$ -in. centers. These burners are placed  $\frac{5}{8}$  in. from the surface being heated. Heating may also be effected by the use of electrical heating elements which are often used to advantage, however, difficulty is encountered in designing heating units for odd shaped dies. To avoid the danger of overheating, burners must be placed so that the flame does not impinge on the material being drawn.

For most work it is imperative to have the heating units thermostatically controlled. In gas fired installations one thermocouple is provided for each burner and is placed as closely as is practical to the surface which the burner is to heat. These thermocouples, through the medium of automatic pyrometers, control the air-gas mixture to the burners. They will control die temperatures to within plus or minus 5 deg. F. A drawing die in operation is shown in Fig. 5.

#### Drawing Lubricants

Magnesium alloy sheet and the die surfaces must be well lubricated be-

**FIG. 4—**Forming 0.051 in. magnesium alloy sheet into a hemispherical tank head with a steel draw ring and aluminum punch die.



fore any drawing operations are attempted in order to prevent scoring or galling of the drawn part and pick-up on the die surfaces. A suitable drawing lubricant for magnesium should possess the following desirable properties:

- (1) Be easy to apply—evenly and smoothly.
- (2) Have a low coefficient of friction.
- (3) Have good film strength.
- (4) Be able to sustain a temperature of 600 deg. to 700 deg. F. without breaking down.
- (5) Be as chemically inert as possible so as to prevent damage

carbon tetrachloride in the ratio of 1 to 160 can be sprayed on the magnesium sheet and is proving desirable for general drawing operations.

After the forming operation has been completed, the part may be cleaned in a solution of 8 per cent chromic acid plus 5 per cent nitric acid. A dip of from 3 to 5 min., at room temperature, is usually sufficient. This solution has a slight etching action. Another cleaner consists of 15 per cent chromic acid solution used at near boiling temperature. Care must be exercised in using this cleaner, since the fumes are harmful to the nasal tissues. Cleaning should be carried

this tendency and is recommended for thick sheets. When heating is necessary dimensional changes due to subsequent cooling must be considered.

**Bending:** This method of working magnesium alloys is used extensively in the manufacture of stringer, clips and stiffener elements in aircraft structures that do not lend themselves to high strength magnesium alloy extrusions. The application of electrical heating elements to the forming dies in a press-type brake is pictured in Fig. 3. Gas-fired burners have also been successfully used for heating of this type. Experimental work now being carried on indicates that Dow-

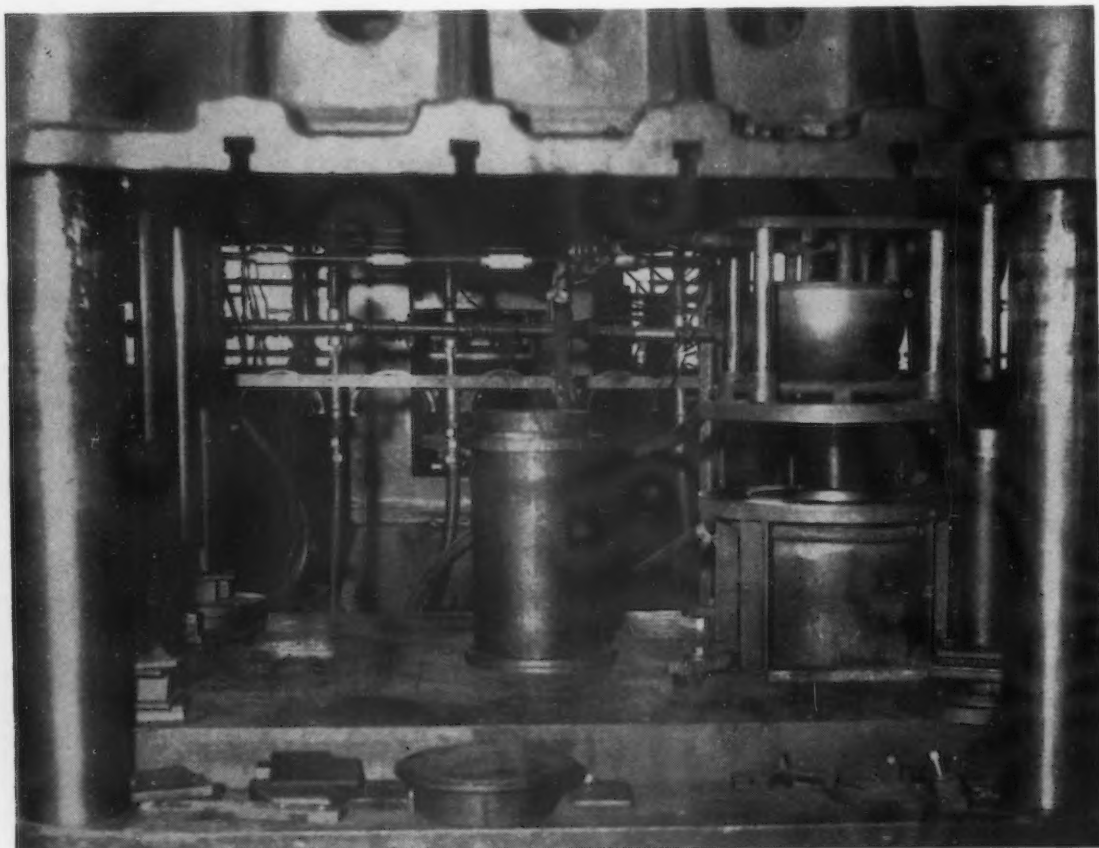


FIG. 5—A drawing die in operation.

to either the die equipment or the drawn part.

- (6) Leave no heavy or burned-on residue which is difficult to remove.
- (7) Have no toxic effect upon the operator.

Twenty per cent graphite suspended in tallow makes a satisfactory lubricant. A similar lubricant, sold under the name of Lubrico Roto-jector X-32 grease, is also satisfactory. Both of these lubricants are applied by buffing on to the drawing surfaces of the die. Colloidal graphite suspended in

on under well ventilated hoods. Both cleaners require a pure aluminum tank.

#### Fabrication

**Blanking:** Thin magnesium alloy sheet may be blanked or punched in the same manner as other metals. When blanking is carried out, using ordinary dies, material greater than 0.064 in. in thickness will show a flaky fracture. If dies are designed with close clearances as described under the heading Blanking Tools, this difficulty will be remedied. Heating the material to 500 deg. F., will also overcome

metal J-1h may be successfully bent to a 4t bend radius through 90 deg. at 350 deg. to 400 deg. F., while Dow-metal alloys J-1a and Ma will bend at 600 deg. F. to a 1t bend radius through 90 deg.

Large compound radii may be formed cold in the press brake by passing the sheet between the operating dies.

**Hand Forming:** It is still customary to employ hand forming where quantity requirements are small and the cost of production die equipment is not warranted, or where intricate contours are to be developed.



Simple bends can be made by using a soft-jawed vise or similar clamping device to hold the part to be formed, and while keeping the part warm by means of a torch, hammering it to the desired shape with a leather maul.

More complicated parts are usually formed over wooden or metallic dies. The metallic dies, although more expensive, are longer lived because of their ability to withstand working impacts at elevated temperatures. Magnesium alloy plates or castings are used for this type of die, because of their machinability and because they possess the same thermal expansion coefficient as the material being formed. The die and blank are warmed, the blank is clamped to the die surface, and deformation is carried out by means of blows from a leather maul.

**Rubber Forming:** Perhaps the most widely used process for working magnesium alloy sheet into shapes requiring only comparatively shallow forming and slight drawing action is the Guerin process, which has found much favor in pressings, such as aircraft wing ribs, door reinforcement panels, etc.

It is customary, in adapting this process to magnesium alloy forming, to use heated dies. This is accomplished by placing the dies on a heated platen or hot plate or, for more complicated dies, by inserting heating elements in the die itself. Where parts are relatively small and flat, they will absorb sufficient heat for forming from the dies; however, material for larger and more intricate parts should be preheated before being placed into position on the dies.

Ordinary rubber, of about 70 Duro-meter, is suitable for forming at temperatures of 250 to 350 deg F., but where higher temperatures, up to 450 deg. F., are required, one of the synthetic rubbers, such as Goodyear Tire & Rubber Co.'s Chemigum, is more suitable. Sticking of the rubber to the formed part may be diminished by the application of corn starch or some similar material to the sheet being formed.

Fig. 6 shows a rubber forming die and heated platen and rubber retaining box. Fig. 7 is a photograph of some aircraft parts formed by the Guerin process as well as the dies over which they were formed.

**Shallow Draws:** When parts are to be made in large quantities or where extreme accuracy is required, it is advisable to use steel die equipment. Such a die designed for forming a wheel fairing is shown in Fig. 8.

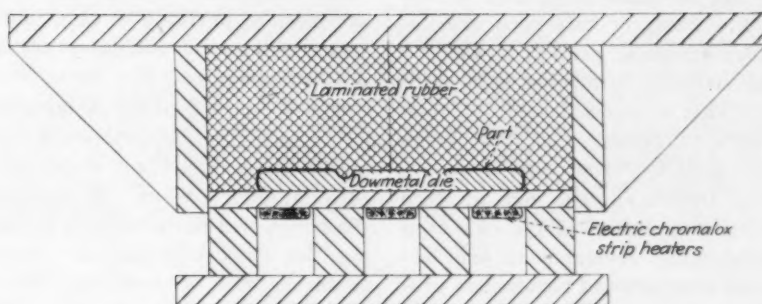


Fig. 6—A rubber forming die and electrically heated power platen.

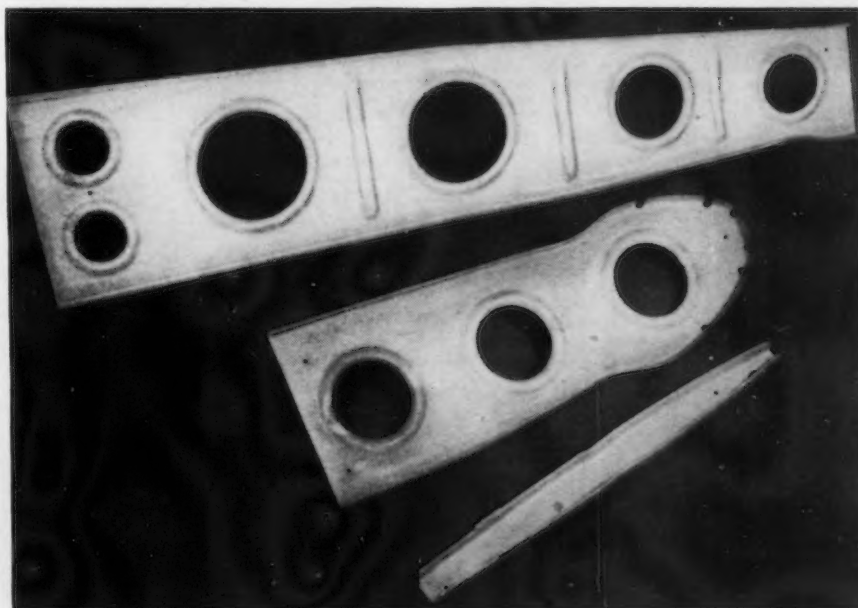


Fig. 7—Aircraft parts formed by the Guerin process.

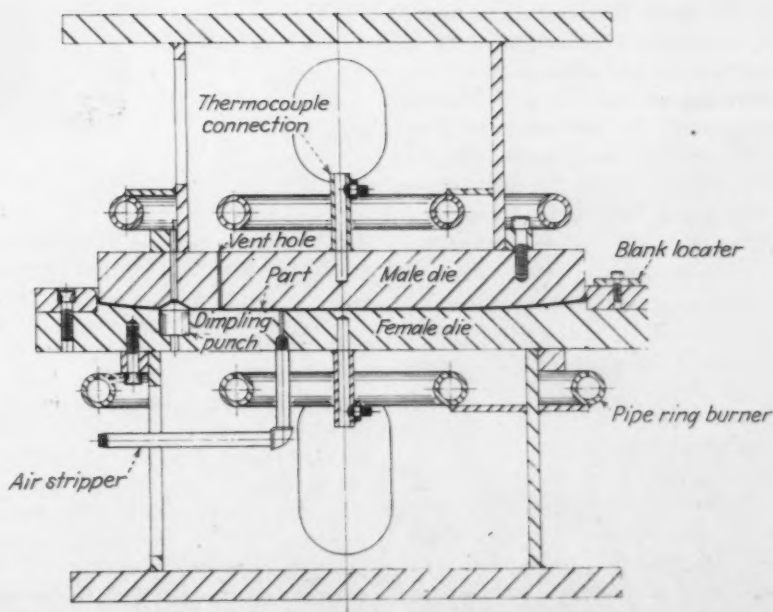


Fig. 8—Die designed for forming a wheel fairing.

They are designed to operate at 600 deg. F. Parts of this type are not so much drawn as pressed to shape—actual material flow being at a minimum. This is accomplished by forming between mating dies that press the metal in its "dead soft" state.

**Deep Drawing:** The art of deep drawing magnesium alloys has been an interesting development and has been the step forward required to pro-

mize distortion due to internal stresses, keeps the dies at a uniform temperature and increases the production rate.

The pressure pad should be adjusted to impart only sufficient pressure to the blank to prevent wrinkling. If the clamping pressure is too great, the punch will have difficulty in drawing the sheet between the clamping surfaces, with a resulting thinning

omitting lubricants from certain areas of the blank in order to obtain frictional resistance to control material flow at critical points when drawing odd shaped parts may be applied to the drawing of magnesium alloys.

When forming small parts, it may not be necessary to heat the male punch since it will absorb enough heat from the draw ring burners. In fact, it is often advantageous to cool the punch when attempting extremely deep draws. This allows the sheet to be drawn over the female draw ring radius at its maximum plasticity but to be chilled immediately by the punch, thereby increasing its tensile strength. This accounts for the 60 to 70 per cent single draw possible in hot forming as against the theoretical 50 per cent

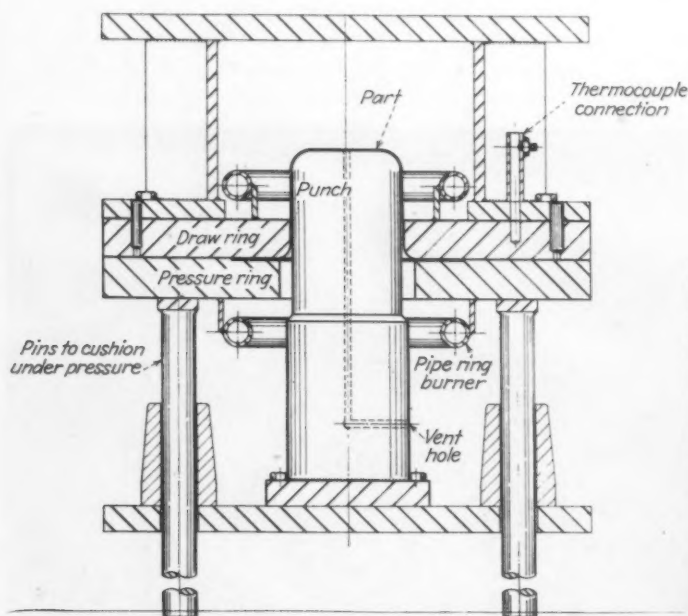


FIG. 9—Details of a die designed for drawing hub caps.

duce such aircraft parts as engine oil tanks, nose spinners, wheel dust covers, hub caps and many other similar parts. Fig. 9 shows details of a die designed for drawing hub caps. Deep drawing cylindrical cups to a depth of 1.5 times their diameter in a single draw, requiring a reduction of 60 to 65 per cent, is not uncommon by this hot forming method. In cold drawing steel it would be necessary to draw to a larger diameter, anneal and redraw to obtain similar results. Square junction boxes have been drawn to a depth equal to their side dimensions. Fig. 10 shows several small parts.

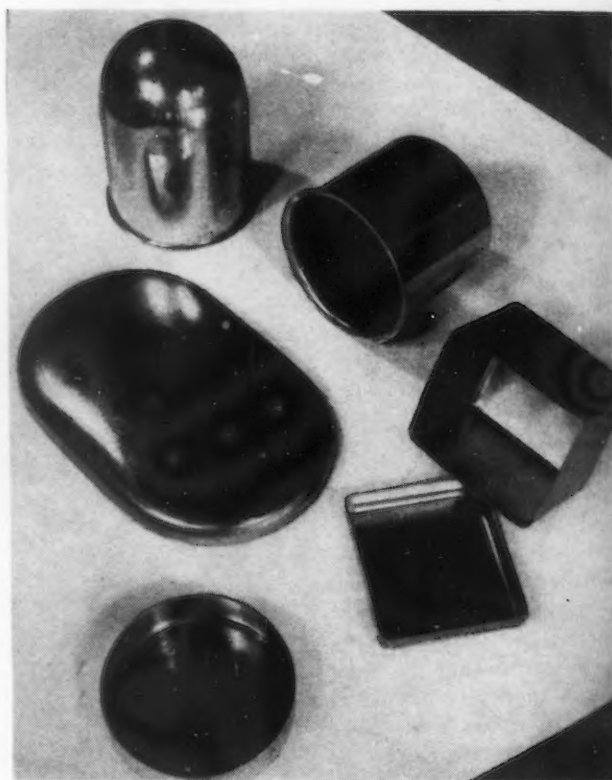
The sheet stock is either bandsawed or blanked to the desired blank shape and lubricated on both sides with one of the lubricants previously described. Lubricant should also be worked into the die surface. It is customary to preheat the blanks to forming temperature in a gas fired oven or by similar means. The advantage of this, compared to placing cold sheet in the dies, is fourfold. It assures proper drawing temperature, mini-

FIG. 10 — Small parts that have been hot formed.

of the drawn part or even rupture due to tension failure. The limitations of the machine often impose minimum and maximum pressure for clamping. Pressure may be reduced by placing spacers or shims, approximately as thick or slightly thicker than the material being drawn, between the clamping surfaces, or the die may be designed with a recess for the sheet. It is difficult to predict what the clamping pressure should be; assumptions only can be made and the proper pressure determined by trial. The practice of roughening the clamping surfaces, cutting retainer grooves or

reduction in cold forming processes.

**Sizing:** The above sequence of operations results in a duplication of parts drawn to reasonable tolerances despite the fact that fabrication has been carried out at elevated temperatures. Aircraft wheel hub caps, 4.75 in. in diameter, have been drawn to a tolerance of plus or minus 0.003 in. or about 0.1 per cent of the diameter; however, these same parts have been sized cold to a tolerance of plus or minus 0.0015 in. The cold sizing die consists of a punch and draw ring both turned slightly undersize to allow





for springback. The piece to be sized is deliberately drawn large, is cooled, and is placed cold over the cold sizing punch. The part is then forced completely through the draw-ring, the spring-back being sufficient to strip the part from the punch on the return stroke.

### Summary

The foregoing discussion depicts the progress that has been made to date on the plastic working of magnesium alloy sheet. Constant research both in alloying and fabricating processes are daily opening up new fields for this light-weight material. It is evi-

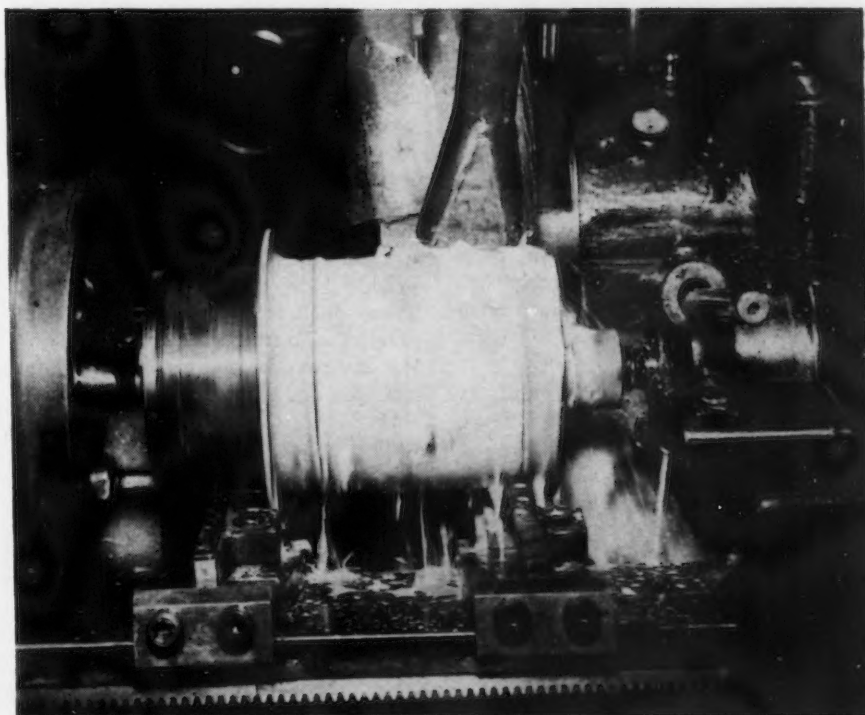
dent that magnesium alloys can be formed into the desired shapes if the designer and press-shop man will supplement their knowledge of forming operations with the information given, keeping in mind the physical limitations of the material and the technique necessary.

## Grinding Thin-Walled Cylinders

**I**N connection with its manufacture of the Pratt & Whitney air-cooled aircraft engine, the Ford Motor Co. has developed and patented a new type of arbor for supporting the thin-walled cylinder barrel so as to minimize heat distortion during the grinding of the o.d. The problem itself arose as a result of the Ford redesign of the conventional cylinder barrel. Instead of being turned and finned from a hollow forging, the Ford barrel is a thin alloy steel centrifugal casting, without fins. The fins are machined out of the skirt or muff extension of the unconventional aluminum cylinder head. The barrels have a shrink fit in the muffs.

After the cylinder barrels are rough machined in Bullard Multi-Au-Matics, they are ground externally on a battery of Norton cylindrical grinders. Due to the thinness of the barrel walls, grinding heat had a tendency to warp them, interrupting production and causing loss of time and material. The new arbor makes possible both internal and external cooling of the barrel during the grinding of the o.d. Fig. 1 shows a cylinder barrel being ground on a two-wheel cylindrical grinder, with a copious quantity of sulphurized soluble oil being poured over the work. Just below the nose of the tailstock can be seen the discharge of the coolant from inside the arbor.

Fig. 2 shows the various parts of the hollow arbor. Coolant is admitted under pressure of 1 lb. per sq. in. through a small hole in the headstock center. Discharge is through a similar hole and exit tube in the tailstock center. This device, coupled with the flood of soluble oil on the wheel, keeps both work and wheel cool and prevents distortion. Incidentally, the grinding finish is held to 6 to 8 micro-in., r.m.s. This fine finish assures a close fit with the aluminum muff which is shrunk over this part of the barrel.



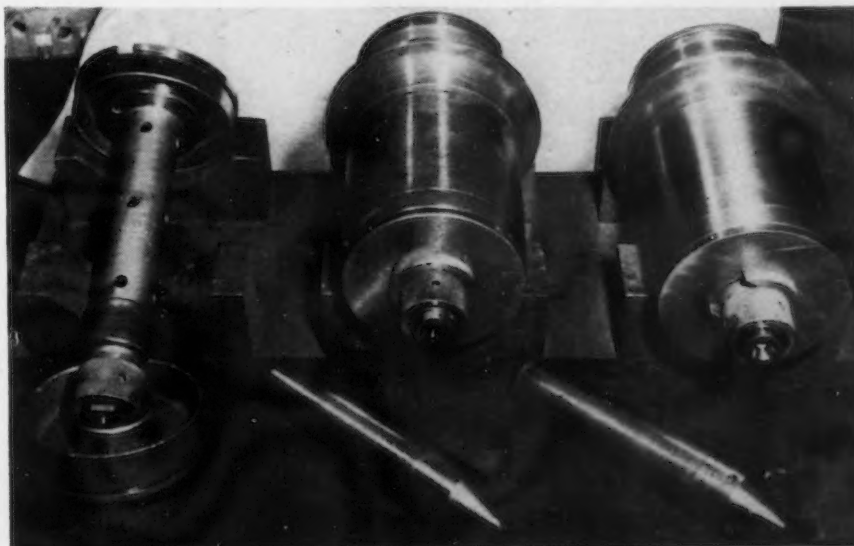
ABOVE

FIG. 1—Thin-walled aircraft engine cylinder barrel being ground on the o.d., while being cooled both internally and externally to prevent heat distortion. Grinding time has been cut from 90 to 20 min.



BELOW

FIG. 2—Component parts of the Ford Motor Co. patented water-cooled arbor. At the left is the arbor itself, showing the orifices through which the coolant passes to cool the inside of the cylinder barrel. In the middle is shown a cylinder barrel mounted on the arbor before grinding, and at the right, after grinding. The centers used to hold the arbor in place are shown in the foreground. The small orifice at the top front of the right center is where the coolant is discharged. Coolant enters and leaves the arbor shaft through holes in the center points.





# Stamping Plant Converts

**T**HE contribution of the Grand Rapids Stamping plant of the Fisher Body Division of General Motors Corp. toward the war effort began six months before Pearl Harbor when it became apparent that machine tools would be a major bottleneck in war armament production. After initial orders the commitments made to this plant for machine tools were generally in volume quantities. This keyed perfectly with the thinking of production and engineering officials accustomed to planning output on a substantial scale. The assembly line approach toward machine tool manufacture, therefore, came as a logical outgrowth.

Entire thinking in this plant, in fact, is along mass production lines. Manufacturing is by assembly stages. All equipment, regardless of the type of work it does is scheduled well ahead and scheduled to capacity. Insofar as possible, workers perform specific steps in the production process and the job then moves on to other

By **STANLEY H. BRAMS**  
*Detroit Editor, THE IRON AGE*

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employees or other crews. Equipment has been adapted to get out the work by the most efficient and fastest means possible and there are a large number of jigs and fixtures used for machining operations.

Four kinds of machines have been produced in volume at this plant. These include two sizes of Liberty planers, a Betts vertical mill, a Morris horizontal drilling and tapping machine and a Fisher horizontal mill—the latter a conception of the Grand Rapids plant, designed to meet specific requirements.

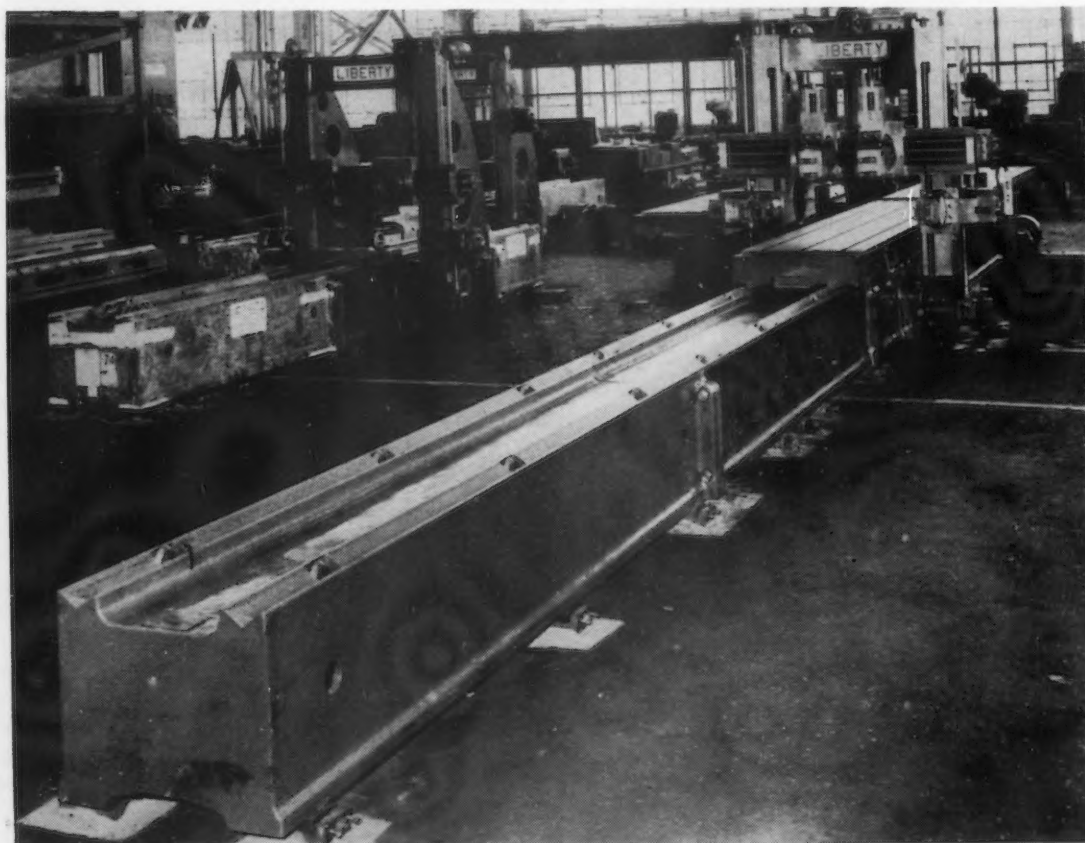
As these jobs came into the plant one by one, production planning began with a breakdown developed on estimated machine time. All work was scheduled through a system closely

approximating mass production operation sheets. These estimates were then sent to the scheduling department where the work was assigned to specific machines for specific times.

Through all this preliminary work, the foremen of the various departments involved became enmeshed much more closely with actual production thinking than is usually the case in factory shops. To supervision was designated the responsibility for a particular contract, and supervisory personnel was consulted in respect to processes and equipment.

These men were thereby able to contribute to a fairly substantial plant-wide understanding of the work being done. Perhaps a still broader contribution was made through the widespread use of illustrative material disseminated right down to the last man in each department. Each assembly item, as example, was broken into all component parts. Exploded prints of these sub-assembly sections were distributed, with each

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**FIG. 1**—Pictured here is a mammoth planer built by the Fisher Body Division of General Motors on a special order in its machine tool building program. With a bed of 48 in., it has a table of 36 ft. or an over-all length of 72 ft. This large machine was constructed in a few weeks.

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# s to Machine Tool Output

part keyed by number. It was then possible for the employees of all departments to see what work they were doing and how it applied to the assembly as a whole.

## First Products Were Planers

The program of machine tool manufacture at Grand Rapids plant was begun when OPM, predecessor of the War Production Board, sought 100 planers of 48 x 48 in. size. Beds ranged from 10 to 36 ft., Fig. 1. Assignment of this job was made to the Grand Rapids plant because its tool room equipment was large and heavy, designed to produce large tools, dies, and fixtures. When automobile production ceased, it was possible to utilize much of the tool room equipment for the new uses. Another reason for the selection of the Grand Rapids plant for this work was that it lies in an area wherein are located many machine shops, available for sub-contracting work. As production

**. . . The Grand Rapids Stamping plant of Fisher Body moved into a new field—machine-tool production—before Pearl Harbor. Quite naturally, production thinking pervaded its planning. The success of its move in manufacturing volume quantities of five types of machine tools is here detailed.**

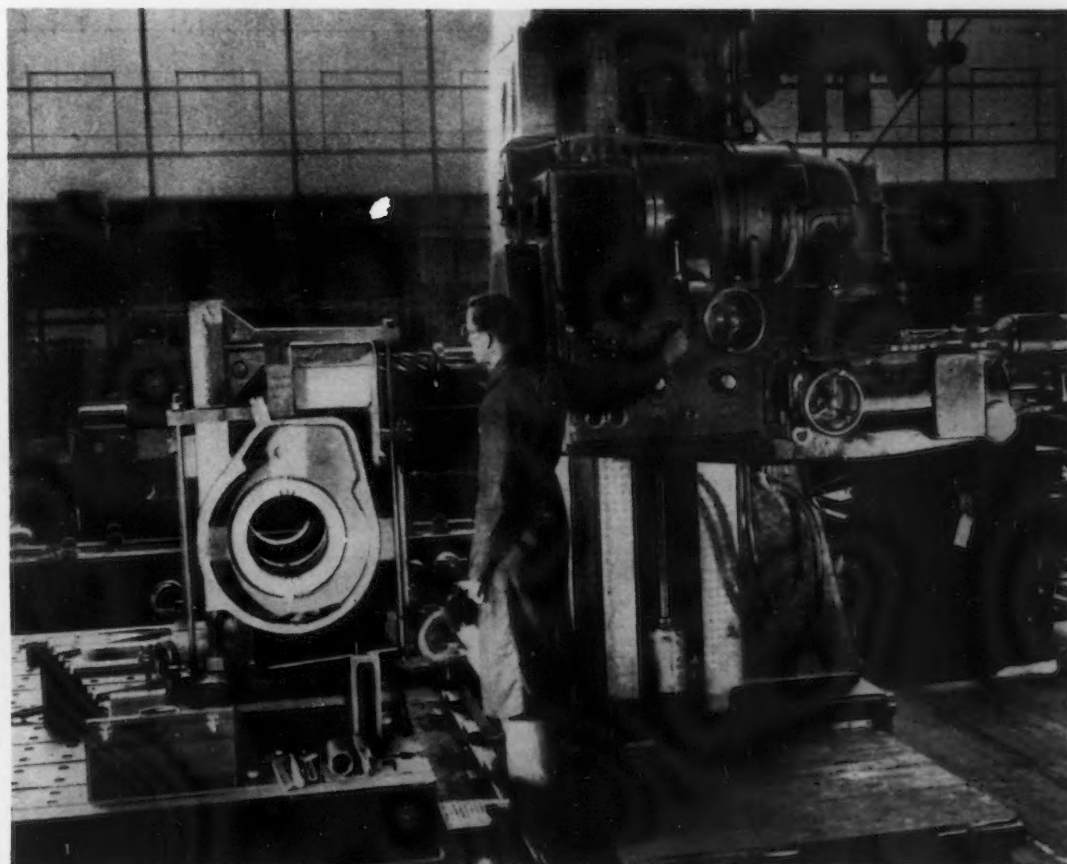
began on the 48-in. planers, the orders were increased and were extended to the larger of the two now being built, the 72 x 72 in. size, with beds of 12 to 36 ft. These machines are built on designs of Liberty Planers, Inc., Hamilton, Ohio.

The experience on this job was such that the government then began to order vertical boring mills from this plant. Other divisions of Fisher Body were in critical need of these machine tools to undertake then forthcoming tank production, and the original negotiations included mills to cover this output only. Later contracts were extended to cover requirements

for other tank producers as well. Subsequently, Fisher designed its own horizontal boring mill and put it into production.

In addition to this work, a considerable amount of miscellaneous machine tool manufacture has been undertaken at Grand Rapids, mainly to specification. The plant has turned out dual head indexing drills, 8-spindle drills, 6-spindle drills, and a special boring machine.

The Fisher-designed horizontal mill, Fig. 2, and the Morris horizontal drilling and tapping machines, Fig. 3, are manufactured in Grand Rapids for use within General Motors Corp., and



**FIG. 2 —** Pictured here is a rugged horizontal boring mill designed and built by Fisher Body especially for work on tanks and anti-aircraft guns. It is one of several types of vital tools this division of General Motors now is building in an extensive machine program.



are not sold to outside sources. The Fisher mill is used mainly for guns, but also has applications in manufacture of tanks and marine engines. The Morris machine is primarily for tank use, but has also served for fabrication of gun parts and for heavy drilling and tapping operations. The Morris mill is made under arrangements with the Morris Machine Tool Co., Cincinnati. The start of manufacture in both these instances was necessitated by the fact that such equipment was not available on the market in quantities and at delivery times which met requirements.

The Fisher mill was designed with twin objectives of simplicity and ruggedness. Built with the processing of heavy parts in mind, it is put together solidly, to handle big and cumbersome parts. It weighs 70,000 lb. and has a 5-in. bar, a 40-in. horizontal traverse and a 60-in. vertical traverse. At the same time, it was engineered with the idea that it might have to be operated by comparatively inexperienced men. The controls, therefore, are devised for simplicity's sake, even though each machine requires 11 motors. From conception to the initial final assembly required but five months.

The other horizontal machine, for drilling and tapping work, Fig. 3, represents a unique job of conversion. Radial drill heads built by Morris were turned on their sides and installed in machines which went to fill

that particular gap in the machine tool market at the time. The machine is a modification of a horizontal boring and drilling machine.

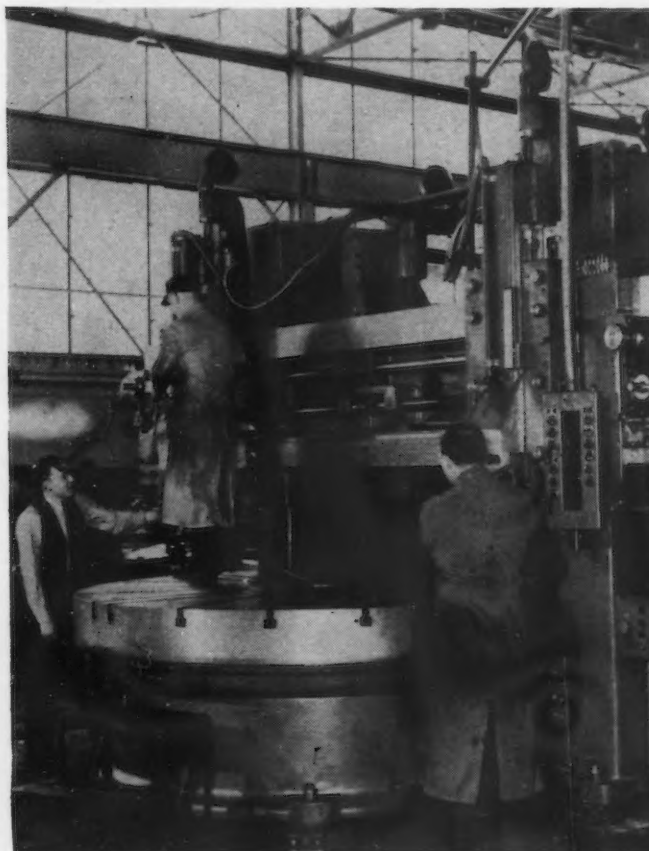
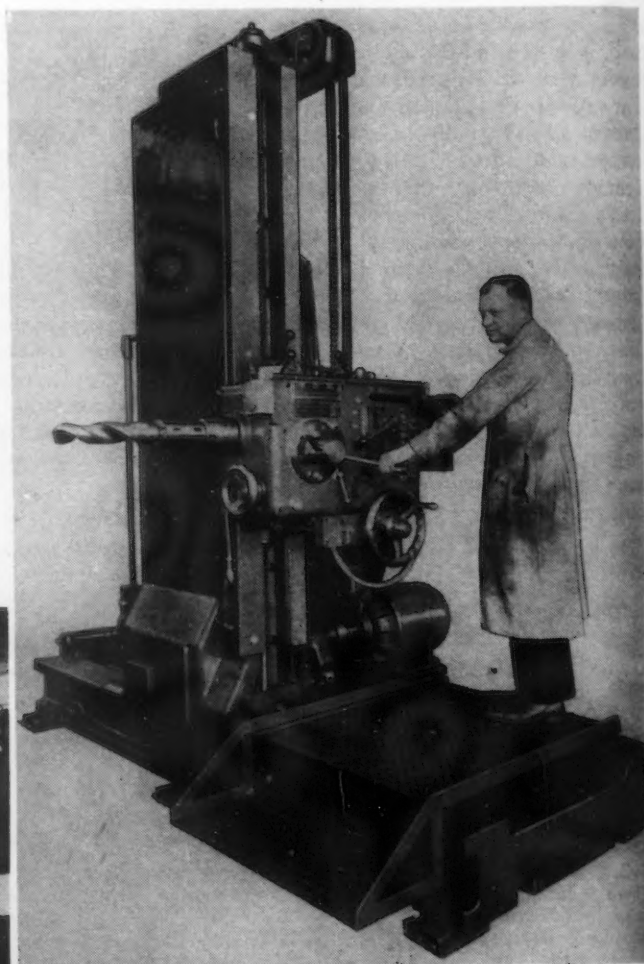
Castings for these parts are completed outside of the division; machining is done both within the corporation and outside. Five major sub-assemblies are involved in the production of each machine: The base, the column, the head, the counterweights and the top.

The item of largest production at this plant has been a vertical Betts mill, Fig. 4, developed in a cooperative program undertaken by Fisher and

Consolidated Machine Tool Corp., Rochester. The Fisher product, somewhat heavier than a standard Betts mill, is an essential in tank fabricating operations. It is a modification of a locomotive tire mill. Two sizes, 100 in. and 112 in., are made at Grand Rapids.

On the final assembly stations for the mills the work method employed is for as many crews of men to be working as there are assembly stations, each crew moving from station to station, where its men perform the same operations. The final assemblies thus are built up progressively as the

FIG. 3—This is the horizontal drilling and tapping machine produced at the Grand Rapids Stamping plant of Fisher Body. This unit was built by taking a vertical drill head, turning it at right angles, and assembling it with controls for vertical traverse. This Morris head job is designed especially for work on tanks and anti-aircraft gun parts.



LEFT  
FIG. 4—This is the Betts mill which is being produced at the rate of approximately one a day at the Grand Rapids plant of the Fisher Body Division of General Motors Corp. There are two sizes, 100 in. and 112 in. Both are of heavy duty standard type.



crews rotate, and a precision of operation and a speed becomes possible which would not otherwise be obtainable. Utilizing this principle of final assembly, it was possible at the period of peak output to produce 10 final assemblies on this mill each week. Since then demand has diminished somewhat and the usual rate of operation turns out around six assemblies per week.

Manufacture of these mills, as in the cases of the other machines, has been accomplished by a maximum of fixture use. Through the use of fixtures, multiple milling operations are possible on several boring mill parts. Use of one such fixture with cycled operation, makes three separate operations possible at one time and saves 12 hours' working time in construction of each boring mill.

Worthy of mention also is the

and crating within half the time of a normal eight hour shift.

In this production job as in the others special tooling is the rule. Exemplary of this is a scraping fixture, Fig. 5, which permits planer saddles to be held at different positions. In these positions they are fitted, scraped and assembled to the heads.

An interesting application of production technique is apparent in the handling of the electrical work on the Fisher mill, Fig. 6. All wiring, 4300

o o o

RIGHT

**FIG. 5—**A rotating fixture for a planer saddle is typical of many swivel fixtures in use at Grand Rapids. Counterbalanced, it permits scraping under the dovetail, followed by a turn-over which permits convenient completion of the head and saddle assembly.



**FIG. 6—**A special department of the Grand Rapids Stamping plant assembles all electrical installations in compact units ready to be taken to the final assembly station and installed. Work is thus considerably speeded in final assembly.

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ft. of it, is done in a production set-up. The electrical assembly is then brought to the final assembly station for simple and quick installation, saving time and space.

A number of scraping stations have been set up for work on this job. Scraping of the horizontal ways is undertaken in a holding fixture which

has been set up over a shipping dock, formerly used for incoming freight trains—a conversion mentioned simply because it epitomizes the way former facilities have been re-shaped to undertake the new work of this plant.

Production quantities are restricted but this much can be said: In the eighteen months in which the Grand Rapids Stamping plant has been engaged in machine tool manufacture, it has turned out 34,452,000 lb. of such equipment. The record is one which would do credit to a long established producer in the field; for a newcomer the job is indeed remarkable.

# Polishing with Glue-Abrasive

**... A further development in liquid cold glues for polishing wheels is a mixture of abrasive grains and cold glue which is brushed directly on the wheel while it is mounted in the lathe spindle. The wheel may be replenished indefinitely by applying thin coatings of the mixture which dry in a few seconds. The reader is also referred to the article by the same author on "Polishing with Liquid Cold Glue," which appeared in the May 1, 1941, issue of THE IRON AGE.**

A PERSON familiar with the finishing of metal parts up to the time defense work increased tremendously a little over a year ago has to change his conception of finish as required on parts produced today. Previously finishing was done mostly in preparation for plating and painting, in other words, for appearance. Now it is done to aid in the mechanical perfection of surfaces. Smoothness to prevent fatigue failure and to allow a part to be Magnafluxed is demanded as never before. Roughness is largely a thing of the past. Many aircraft engine parts, for example, are polished all over.

The standards for these practices have been set up by the companies who have been making these war products for a number of years and by the rigid specifications of the Army and Navy. They knew what was required. However, where previously only a few companies made these parts in relatively small lots, hundreds are now producing high quality products in large quantities. Where previously slow hand methods were satisfactory for making the required few, fast machine methods are mandatory for making the present thousands.

For instance, articulating rods for air cooled aircraft engines were produced at the rate of 10 to 12 per 8-hr. day per man. Now, with new

materials and methods as many as 32 complete rods are finished by one man per day. Contributing to this increase are felt, leather or muslin polishing wheels, plus glues which are not affected by high degrees of heat created by polishing and burring. These wheels remove burrs and corners as well as produce the required smooth surface. Such finishing operations are applied to master rods, crankshafts, rocker arms and the like. The following cycle is typical of the operations performed:

1. Grind where required to remove excessively deep tool marks and to blend surfaces to the required shape. No. 46 rubber bonded wheels are used for this purpose.
2. Rough polish, generally with No. 90 aluminum oxide grit. If cold glue (like Nuglu) is used to set up the wheel, it will produce two to five times as much work as with hide glues.
3. Oil out with either Nos. 150 or 180 aluminum oxide grit. This is done with a new type of grit and cold glue mixture, blended into one and brushed on the wheel.
4. Brush with an oil treated tampico wheel using a fast cutting burring compound, not emery cake.

Wheels or bobs set up with cold glue will produce much more work than hide glue as they are not af-

fectured by temperature. Cold glues have a silicate of soda base which has been modified so as to be both fast drying and flexible. The abrasive grain is presented to the work uniformly at all times. As an example, for polishing the end of the channel on an "art" rod, hide glue will only finish one-half to one rod. Cold glue will produce three to four rods. This is actual practice in at least four plants.

Oiling out or final polishing is being done by the use of the mixture of cold glue and grit (Brushing Nuglu) because the finish is far superior to other methods. In this instance, the glue partially covers the grit and imparts a beautiful burnished finish to steel. Productive life of wheels or bobs set up like this is many times greater than wheels set up by older methods. Grease stick is used on these wheels. The finish produced by this method can easily be brushed by the tampico wheel if required but generally it is not necessary. Tool and die plants have found Brushing Nuglu very advantageous on their products.

When wheels are set up with cold glue, heat of 140 to 180 deg. F. should be used for drying as such wheels will perform much better. Longer life and a freer cut are the benefits.

Cold glue abrasive mixtures like Brushing Nuglu can be obtained in various viscosities and may be used in various ways to accomplish different results. Grain sizes from No. 46 to No. 500 are used. A heavy viscosity product will give a maximum of cutting, especially if used with coarse grain sizes. In the medium or fine grain sizes, thinner viscosities give either a polished finish or a satin finish. These thin mixtures can be applied to wheels which have been sized with a thin cold glue sizing, dried overnight and used as a polishing wheel to cut down various parts. The same mixture, when used on an unsized wheel and dried in only a few minutes will give a satin finish.

To prepare a wheel for such work,



# ve Mixtures

By J. F. SIEFEN

J. J. Siefen Co., Detroit



**T**HE first coat of Brushing Nuglu is applied while the wheel is stationary. In a few minutes the wheel is ready for use. Brushing Nuglu saves the operation of rolling in abrasive grit and the long drying period usually involved.

a very thin head of Brushing Nuglu should be applied to the face of the wheel with a fairly stiff brush. It is best to start with a clean buff or wheel which has a short nap. A folded 18-ply buff with  $\frac{1}{2}$  in. square sewing works best. When this work is done on the polishing lathe where the blower can help dry the face, a waiting period of 5 to 8 min. is necessary before the wheel can be used. Proper breakup is obtained by breaking the face of the wheel with the fingers prior to operating the wheel. A wheel prepared in this manner can be used for a period of about 15 to 30 min. When the wheel ceases to cut, a thin coat of the mixture is again applied while the wheel is revolving on the spindle, and in 5 sec. the wheel is ready for polishing again.

Theoretically, it is necessary to establish a foundation on the wheel first so that by the application of a thin coat every few hours, the best results will be obtained. In production on a very tough job, this wheel should stand up for at least 3 hr. before applying a succeeding coat. Operating speed with these wheels should be between 6000 or 7000 ft. per min. and the surface speed must not exceed 7500 ft. per min. Slow speeds are best.

For instance, rocker arms are rough polished with cold glue (Nuglu) and No. 120 grit set up in the conventional way. They are then oiled out with a No. 200 grit and cold mixture (Brushing Nuglu) on a wheel which has been sized and dried over night. Next, this same mixture is used on an un-

sized wheel, dried only a few minutes and used to produce a satin finish. This last operation resulted in a savings of material of 80 per cent and an increase in production of 25 per cent in one particular plant.

This thinner cold glue mixture has shown remarkable possibilities for increasing production. The original set-up lasts quite a long time and can be renewed in a few seconds. It dries on the wheel while it is on the spindle. One example of increased production was a boost from 200 pieces per hr. to 275 pieces per hr. due to the longer life of each head applied by the brush.

Burring is also being done with these mixtures of cold glue and grain. For burring operations a hard  $\frac{1}{4}$  in. square sewed buff is preferred. The buff is raked to obtain a short nap on the face and a heavy coat of Brushing Nuglu is brushed on while the wheel is stationary. The coat is first brushed against the nap, then with it. This buff is dried at 150 deg. F. for 25 to 30 min. in an oven or at room temperature for 3 to 4 hr. After the buff is placed on the lathe, the head is broken by applying a pipe or flat piece of metal against the face very lightly at first and then increas-

ing pressure until a fine break up is obtained.

The buff is now ready for burring. After a few pieces have been done another light coat of the mixture is applied while the buff is revolving. This will dry in a few seconds.

As soon as cutting diminishes, another thin coat of the abrasive-glue mixture is put on the cloth. Work is always done with the rotation of buff down, not up.

Burring compounds on tampico wheels which will remove burrs on gears, rods, etc., are a later development to increase production on this operation. One of the best instances of its success can be illustrated by citing the case of gear burring on an automatic machine. As originally set up, 620 pieces were being produced in 8 hr. and a whole emery cake was consumed in the process. Use of burring compound enabled the machine to be speeded up to produce 1440 pieces per 8 hr. Less compound, by almost one-half, was used to produce the greater number of pieces. The ability of the compound to stick to the tampico wheel and a fast cut are contributing factors. These compounds are made in various grain sizes to suit every need and finish.



# Electronic Variable-Speed

**T**HE experience obtained from the use of thyatron motor controls for more than a decade has made possible the development by General Electric of a new electronic variable speed drive with features and characteristics that make it ideally suited to a vast number of industrial applications. The versatility of this new drive which has already been applied extensively, is made possible by a new adjustable-voltage electronic control system, called Thy-mo-trol.

There are in service a relatively large number of thyatron motor speed controls and there are many applications in industry for the use of such equipment. Generally speaking, these equipments consist of an adjustable-voltage rectifier using thyatron tubes to supply the d.c. for the field and armature of the motor. By varying the output voltage of the tubes the speed of the motor can be changed. Some type of feed-back system is employed to do this, and it may be of either the mechanical or electrical type.

The phase-shift method is one of the most common ways to vary the output

By S. D. FENDLEY  
Electronic Section, Industrial Control  
Division, General Electric Co.

voltage of a thyatron tube. This employs the use of a resistance-reactance bridge which permits the phase relation of the grid voltage to be varied with respect to the anode voltage. By varying one of the elements in the bridge circuit, it is possible to change the phase displacement of the grid voltage with respect to the anode voltage from a condition where the two are in phase to the point where they are 180 deg. out of phase. When the two voltages are completely in phase, the tube will be turned full-on. When they are completely out of phase, the tube will be turned off completely. By varying the voltage relation between these limits, the tubes can be turned on to any desirable degree.

In a mechanical feed-back system, one of the elements in the phase-shifting-bridge—usually the reactor

—is varied mechanically to change the output of the tubes and thus regulate the speed of the controlled motor. Where speed regulation is an essential factor, an electrical feed-back arrangement is employed. As in the mechanical arrangement, a full wave rectifier is used, but a saturable reactor instead of a movable core reactor varies the output of the voltage on the motor.

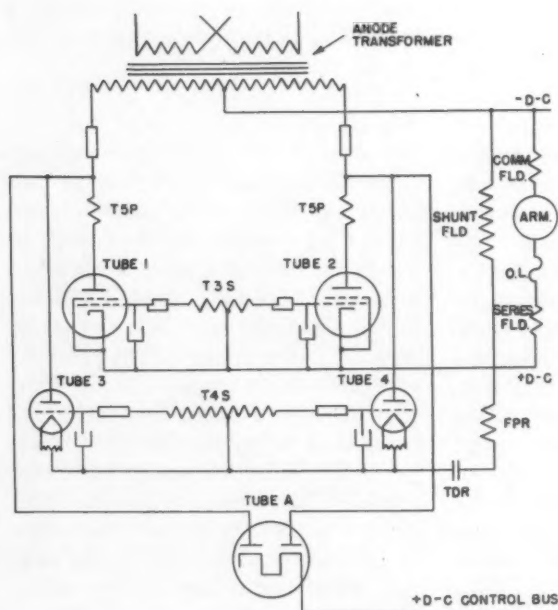
## Fully Automatic Control

The G-E Thy-mo-trol control system in combination with a suitable motor provides a variable speed drive with features not ordinarily found in other conventional drives, such as close speed regulation, smooth acceleration, precise control of speed, and other similar features.

The standard Thy-mo-trol drive consists of an anode transformer, a control and rectifier panel, a push-button station or other control accessory, and a d.c. driving motor. In some instances, a smoothing reactor may also be required, depending upon the size and characteristics of the motor. The anode transformer is used in order to make use of motors of standard voltage. The transformer is of conventional design and may be either of the insulating or of the auto-transformer type.

From the diagram shown in Fig. 1 it can be seen that a pair of tubes (Tube 1 and Tube 2) constitutes a full-wave rectifier which converts to direct current the alternating current supplied by the anode transformer. The direct current is then fed through the armature of the motor. Likewise, Tube 3 and Tube 4 make up a full-wave rectifier which supplies direct current to the shunt field of the motor. By varying the outputs of these two rectifiers, it is possible to control the operation of the motor. Its speed can be varied from zero to basic by armature-voltage control, and up to maximum operating speed by field weakening.

The output of the power rectifiers is varied by a group of radio-type control tubes, not shown in the diagram. Acting as amplifiers of current



POWER CIRCUIT  
Fig. 3

FIG. 1 — Circuit diagram showing thyatron rectifiers connected to motor.

# Drive for Machine Tools

and voltage signals received from the motor circuit, these tubes supply the necessary direct current to the winding of a saturable-core reactor in a resistance-reactance bridge which is used to vary the output voltage of the power rectifiers by the phase-shift method described. By varying the current in the saturating winding, the power tubes are turned on or off as required to give the desired motor performance.

## Current Transformer Used

To provide for the current-limit acceleration of the motor, a current transformer is used. The design is such that an a.c. voltage is produced in the secondary, proportional to the current flowing through the thyatron tubes. The a.c. voltage is rectified and connected into the circuit in such a way that when it reaches a value as determined by the setting of a potentiometer, it will have the effect of turning off the armature tubes, thus reducing the voltage on the armature and maintaining the current at a fixed maximum value.

If the control is set to operate the motor in the field-weakening range, the current-limit control will maintain full field until the armature current starts to reduce. At this point, the field will be weakened gradually until the motor reaches the preset field weakened speed. Then the armature current will drop to running value.

The adjustment of the speed is controlled by two adjustable potentiometers. One controls armature voltage, the other controls field voltage. The potentiometers are operated from a single shaft and are arranged so that approximately half of the rotation of the adjusting knob will vary the armature voltage from approximately zero to maximum. Then the other potentiometer becomes effective, and further turning will tend to reduce the field voltage so that the motor speed can be increased to the value desired.

To maintain accurately the preset speed, it is necessary to hold armature counter-e.m.f. constant by increasing the armature terminal voltage by an

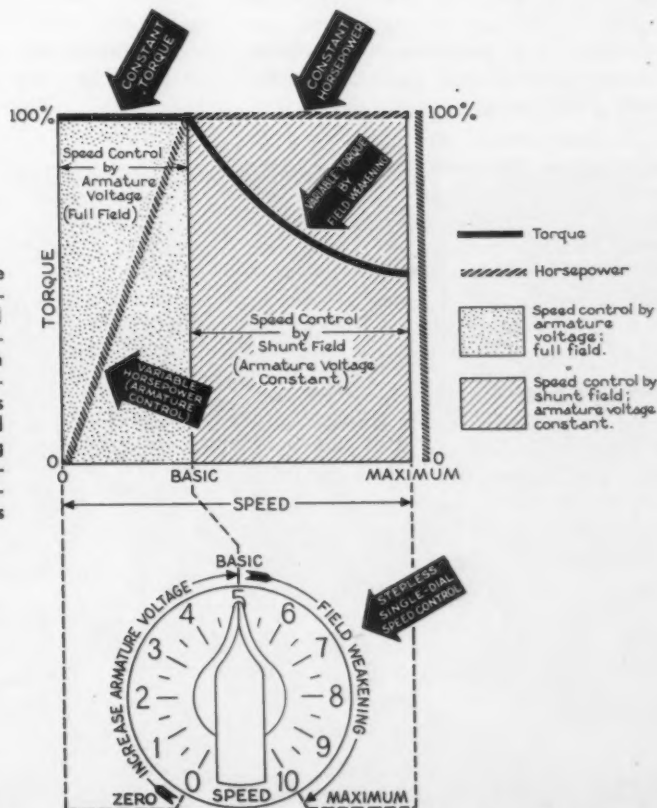
... **Electronic motor controls have been in use for about 10 years, but these were primarily for motor speed adjustment only. The new G-E Thy-mo-trol system is a fully automatic control that gives wide speed variation, close speed regulation at the selected r.p.m. and control of acceleration and starting current.**

amount equal to the IR drop of the armature circuit. In this system, the circuit functions in such a manner that as armature current increases, the thyatrons in the armature circuit are turned on, thus increasing the armature voltage. If the load increases, the circuit operates to increase the armature voltage proportionally, which thus acts to maintain the speed at its preset level.

When the motor is operating at speeds below basic, during which it has full-field voltage and reduced armature voltage, it will provide con-

stant torque. The horsepower output will decrease in proportion to the decrease in speed. When operating at speeds above basic, during which it has full-armature voltage and reduced field voltage, the motor will provide constant horsepower and reduced torque output. This is illustrated by Fig. 2 which shows the torque and horsepower curves for the full operating range. Fig. 2 also illustrates how the speed is increased by armature voltage as the speed adjusting potentiometer is turned from zero to midposition, and how the motor op-

FIG. 2 — Curve showing how motor torque and horsepower characteristics vary with motor speed. Coupled with curve is drawing of speed control dial showing how speed is controlled in the armature and field ranges by a single dial.



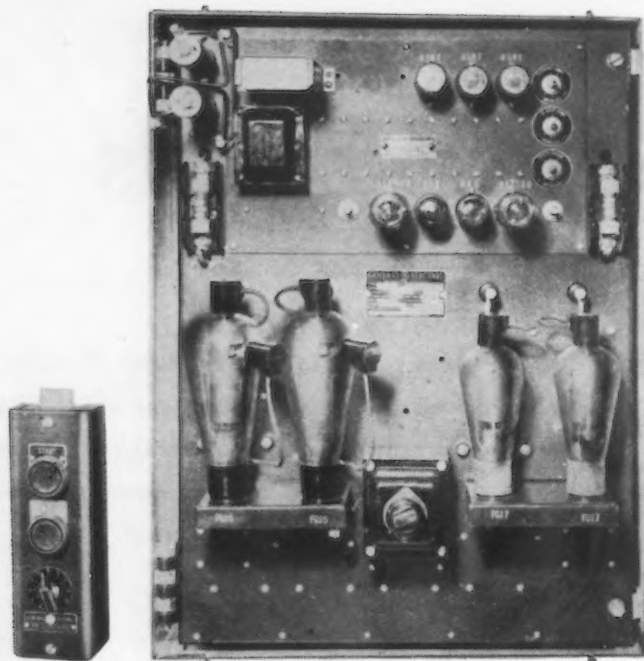


FIG. 3—Thy-mo-trol panel (right) and heavy-duty type push-button station—these together with an anode transformer and a d.c. driving motor comprise the standard Thy-mo-trol drive.

erates by field weakening from mid-position to the extreme clockwise position.

Fig. 3 shows a conventional type of control panel. It consists of the control and power tubes, line contactor, thermal overload relay, field-failure relay, cathode-protective timer and the necessary transformers and other material required for the electronic circuit. Suitable anode fuses are provided for protection against short circuits. The control accessory at the left is a standard heavy-duty-type push-button station in which are mounted the necessary number of momentary contact units and the speed adjusting potentiometer.

A shunt-wound d.c. motor is used, usually at 230 volts. Although the motor is of conventional design, its characteristics must be such that it will operate satisfactorily from an unfiltered rectifier supply.

#### Acceleration

The accelerating scheme employed in this drive is termed constant-current limit acceleration. It is possible to vary the accelerating current and thus the accelerating torque to a value which will bring the motor up to operating speed in the quickest time consistent with the nature of the load and the commutating ability of the motor.

As soon as the start button is pressed, the motor will assume the maximum value of current set and will pull with uniform torque until the load is up to speed; then the current will drop off to the value needed to maintain the required torque.

This equipment also provides for accelerating the motor up to a given speed called for by the setting of the potentiometer. Quick stopping of the motor is provided by means of conventional dynamic braking.

The standard equipment does not provide for regeneration or pump-back, so that when the speed adjusting potentiometer is quickly turned from a high setting to a lower one, the motor will coast down to the new setting at a rate determined largely by the friction of the load. This means that the drive is not suitable for use with overhauling loads.

Ordinarily when motor speed is be-

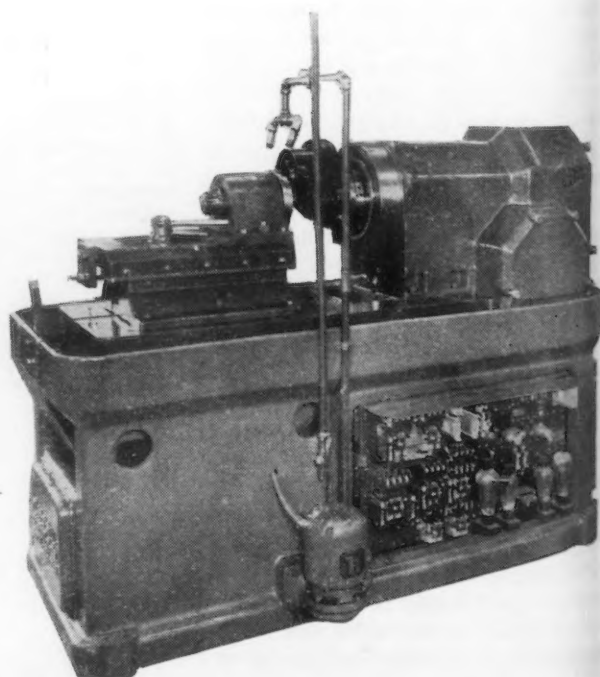
ing reduced with field applied, the motor acts as a generator and generates an excessively high voltage. In the Thy-mo-trol system, a "voltage-snubbing" circuit automatically keeps the voltage down to a safe value. Where quick slow-down is required, a modification can be furnished which provides a form of automatic dynamic braking to slow down the motor. A typical application is one on a turret lathe where the spindle speeds must be stepped up or down rapidly with each indexing of the turret.

#### Speed Range Wide

The speed range obtainable theoretically is something from a value approaching zero up to the maximum for which the motor is designed to operate by field weakening. The practical limits are largely determined by the heating and stability of the motor. From tests, it appears that the motors can be operated over a range of up to 20 to 1 below base speed by armature control on an intermittent basis without exceeding a dangerous temperature rise, and by field control as high as the motor is designed to operate. Much, however, depends upon the nature of the load to be handled, the duty cycle, etc.

By providing closely regulated armature voltage and automatic compensation for R.I. drop, this system holds the motor speed constant within close limits, independent of load and ordinary line voltage variations. For a given speed setting, the equipment can be adjusted to hold the regulation to a value of approximately 2 per cent variation from no load to full load when operating below the

FIG. 4—Built-in application of Thy-mo-trol to form and thread milling machines.





basic motor speed. When the motor is operating in the field weakening range, the speed will decrease with load, to a value not exceeding 10 per cent, depending upon the rating of the drive.

The system will operate successfully on line-voltage variations of as much as 10 per cent of rated voltage, but to obtain maximum tube life the variation should not exceed plus or minus 5 per cent.

One very important consideration with any electronic equipment is the question of what will happen if one or more of the tubes should fail. In this system, the circuits have been so designed that the equipment is entirely safe regardless of which tube or combination of tubes may fail. The equipment will either shut down instantly or will continue to operate, deprived of the function of the tube which fails.

#### Typical Applications

Most of the applications of the Thy-mo-trol drive have been made to

machine tools because of the present limitations in size. Among the types of machines to which drives have been successfully applied are grinders, milling machines, toolroom lathes, turret lathes and thread mills. In addition, they have been supplied for automatic welding machines and for various special equipments.

One application has been for driving the headstock on grinders. The wide speed range obtainable and the constant torque characteristics provided at low speed make it possible to provide the right speed for every type of grind. Simplification of the headstock itself has been made possible through the elimination of gears and pulleys.

The machine can be made entirely self-contained, and it can be moved at will without worry as to the availability of a d.c. power supply.

For reversing table drives, the use of two independent speed-adjusting potentiometers makes it possible to provide full-range, independently ad-

justable speed for both directions of travel. A simple relay for selection between the potentiometers and a standard double-throw limit switch are all the additional apparatus needed.

The electronic control can be supplied in a form suitable for building into a machine in the same manner as conventional control equipment. An interesting application of this type is shown in Fig. 4 (cover removed) which shows a panel of this type built into a planetary type form and thread milling machine. In this instance, the electronic equipment is combined on a single panel with standard magnetic switches used for starting the coolant pumps, etc. The features provided by the Thy-mo-trol system used on the work spindles have helped to increase production materially by increasing the amount of work that can be done between grinds, lengthening the life of the cutter, and by eliminating the necessity for changing gears and sheaves to obtain the necessary range of speed.

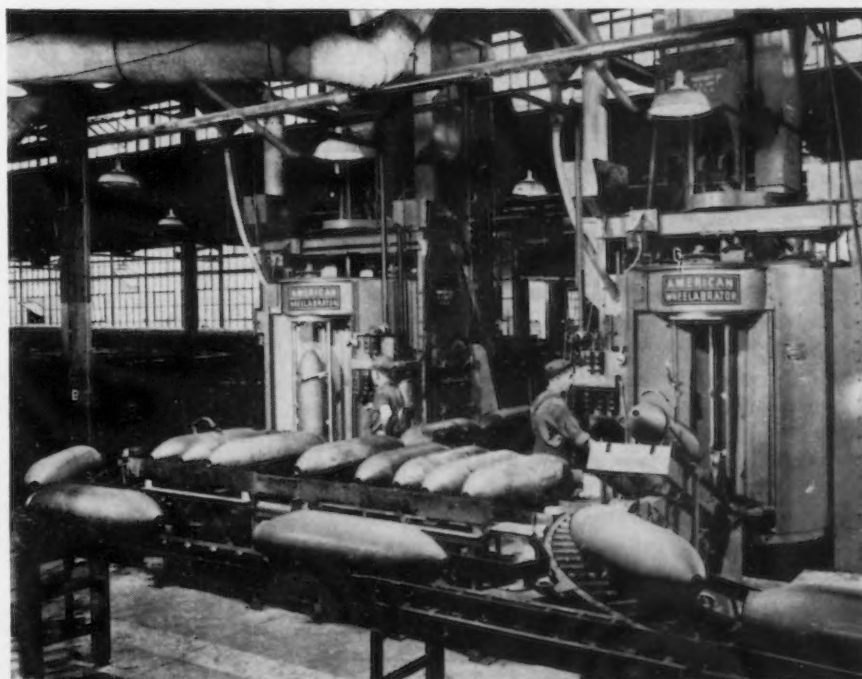
## Blast Cleaning 500-Lb. Bombs

**B**OTH the exterior and the interior of 500-lb. semi-armor piercing and demolition bombs are cleaned of scale prior to the machining operations in the two Wheelabrator units shown, made by the American Foundry Equipment Co., Mishawaka, Ind. An airless Wheelabrator unit is used for blast cleaning the exterior and compressed air grit blasting to remove heat treat scale from the interior of the large bombs.

Operation of the bomb cleaning machines is entirely automatic. From the conveyor line a bomb falls into a loading device which lifts the bomb into a hanger at the front of the machine. As the bomb-laden hangers pass into the blasting chamber they are indexed and rotated over a lance type air blast nozzle which enters and thoroughly scours the interior of the bomb with steel abrasive. At another station the bomb is rotated in front of an airless Wheelabrator unit whose blast completely covers the exterior of the bomb. As the cleaned bomb

revolves to the front of the cabinet it is removed and another bomb placed in the hanger. With only a

few minor changes this type machine is used for cleaning a wide range of sizes and types of shells.



# Stress Cracking of Brass

By MAJOR H. P. CROFT  
and  
G. SACHS

Department of Metallurgical Engineering,  
Case School of Applied Science,  
Cleveland

**... Concluding their investigation reported on last week, the authors discuss residual stress and its dependency upon the type and magnitude of cold work, sum up the important general features of stress cracking and investigate theories of the phenomenon. Last week the authors reported on the ammonia and mercury tests for stress cracking.**

CORROSION cracking in service is attributed in most instances to the presence of residual stress in cold-worked articles, such as drawn rod, tubing, and deep drawn or spun cups. Tensile stresses which exceed the magnitude required for both corrosion cracking and mercury cracking have frequently been found to be present in the surface layers of such products (Fig. 9),<sup>91, 92</sup> while they were exposed to the attack of the atmosphere, of ammonia, or of mercury. The magnitude of these stresses can be determined frequently only in an approximate manner by mechanical methods which consist of dissecting the article and measuring the resulting distortion.<sup>94, 95</sup> A few investigations have been carried out regarding the correlation between such residual stress and the resulting mercury cracking (Fig. 10), which confirm the general view that the presence of tensile stresses higher than approximately 15,000 lb. per sq. in. at the exposed surface is a prerequisite of mercury cracking.<sup>10, 91, 92</sup>

An attempt has been made by the authors to investigate simple condi-

tions in brasses containing residual stresses in regard to the relation between the stress cracking under simultaneous residual and external stress. Wires finished by cold drawing are inherently more susceptible to mercury cracking (Fig. 11), than those finished with like reductions by cold stretching (Fig. 7). They will, as a rule, crack in mercury and in the atmosphere without any application of external load because of the presence of residual stress. The cracking tendency appears to increase in relation to the magnitude of residual stress. The foregoing conclusion also explains the maximum of cracking tendency which is reached on cold drawing at a reduction of area in the vicinity of 20 per cent (Fig. 12). Cold-drawn wire has been previously found to possess a similar maximum of residual stress at approximately the same reduction (Fig. 12).<sup>91</sup> If an additional external load is applied to a drawn wire which contains high residual stress, the cracking tendency is affected but little. This is explained by the fact that the sum of the residual and the external stresses cannot ex-

ceed a value which should correspond approximately to the yield strength for the particular temper involved. Correspondingly, with high external loads approaching the yield strength, the cracking tendency of drawn wire approaches that of a stretched wire presumably free from residual stresses (Fig. 13). Therefore, the cracking tendency of drawn wire depends primarily upon the residual stresses developed during processing while the effects of other characteristics such as temper, strain hardening per se, grain size, and orientation are superimposed.

There are numerous other factors which influence the stress cracking of brass, particularly those factors resulting from variations in the processing of brass. The cracking tendency in both the atmosphere and mercury increases considerably with the grain size of the annealed metal (Fig. 8).<sup>74, 80</sup> This influence is so pronounced that quite severe conditions of stress are probably necessary to cause season cracking in service of brass parts made from small grained metal. However, single crystals, which do not contain any grain boundaries, have been found not to be subject to mercury cracking.

This grain size effect is retained in cold-stretched wire, but is progressively reduced by cold drawing. Stress-relief annealing again increased the difference between the cracking tendencies of fine-grained and coarse-grained cold-drawn wires.

The tendency to crack in mercury

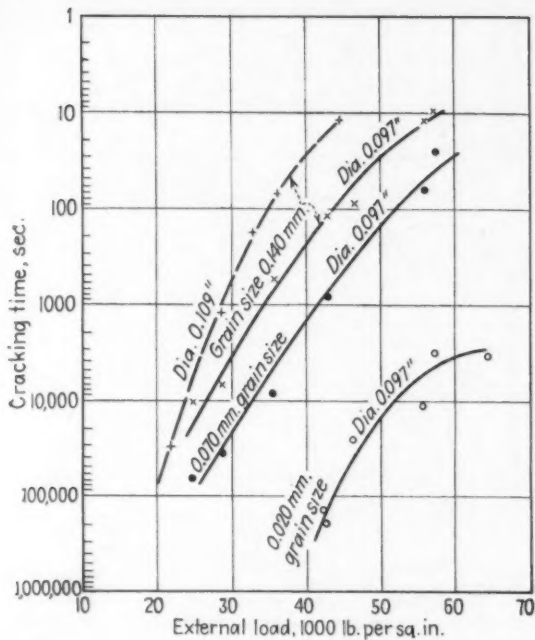


FIG. 8—Effect of grain size and diameter on cracking tendency in mercurous nitrate of brass wire cold worked by stretching. Reduction of area, 21 per cent.

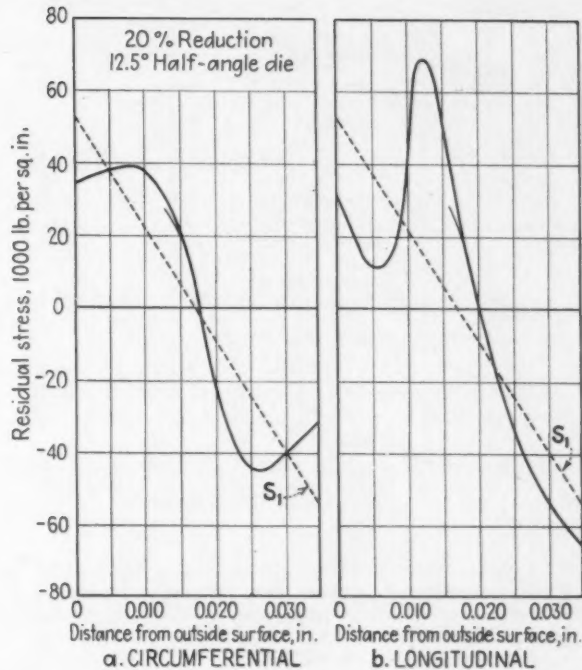


FIG. 9—Residual stresses in wall of a sunk cartridge brass tubing. (Sachs and Espey)

also decreases as the diameter of the wire decreases (Fig. 8), other variables such as grain size, temper, and external loading being identical.

The tendency to crack increases with the increase of preferred orientation (Fig. 14).

In these tests the preferred orientation was determined by W. M. Baldwin, Jr., from longitudinal sections (Fig. 15). The angles between the drawing direction and the sets of twins in each crystal were measured. Their frequency (Fig. 16) can be used to evaluate quantitatively the magnitude of preferred orientation.

The various effects of processing conditions on the mercury cracking tendency were found to be similar for alpha and beta brasses. Like alpha brass, beta brass cracks more rapidly in the drawn condition than in the annealed; like alpha brass, the tendency to crack increases with increase in grain size; and again like alpha brass, the cracks in beta brass are almost invariably intercrystalline (Fig. 5).

Commercial, cold-worked brass may or may not be highly susceptible to stress cracking, depending upon the sign and magnitude of the residual stresses developed. Extensive literature has been published on this phase of stress cracking.<sup>64, 66</sup> The strain hardening of the metal is determined by the magnitudes of cold-work, while the residual stress is dependent in a

very complex manner upon the type and magnitude of cold-work.

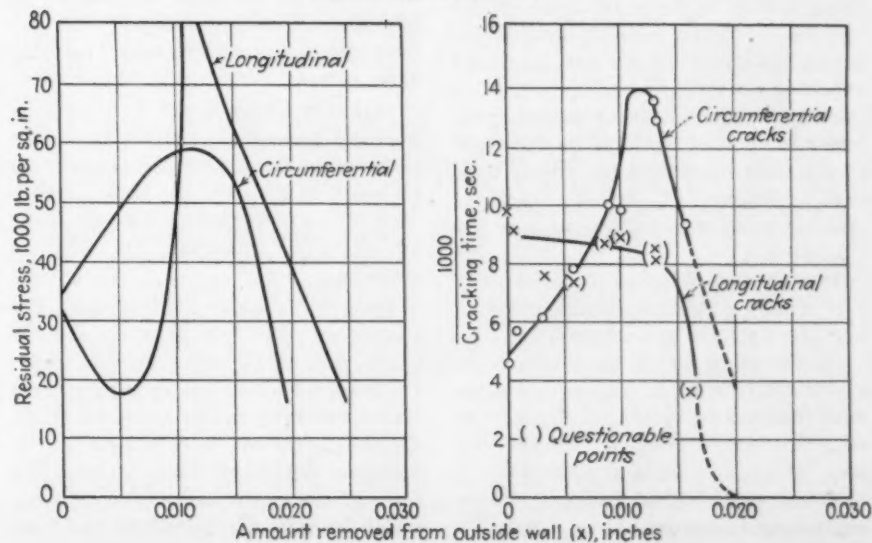
The residual stresses are materially changed by subsequent cold-working, such as stretching, bending, roller-straightening, etc. These treatments, as a rule, reduce both the tendency to stress crack and the magnitude of the residual surface tension.

Both the tendency to stress crack and the residual stress are reduced and eliminated by a stress-relief anneal (Fig. 17), the extent of relief de-

pending upon the temperature and time of such an anneal. Many recommendations have been given for such stress relief processes, which on the one hand eliminate the danger of stress cracking, but on the other hand retain the increase of strength caused by strain hardening.<sup>66, 68</sup>

The relief of stresses in a low temperature annealing operation, as indicated by the mercurous nitrate test on externally stressed pieces, does not take place suddenly and entirely at

FIG. 10—Relation between residual surface stress and cracking tendency of sunk brass tubing, the outside surface having been pickled off by various amounts. The chart on left shows surface stresses; that on right, cracking in mercurous nitrate solution. (Sachs and Espey)





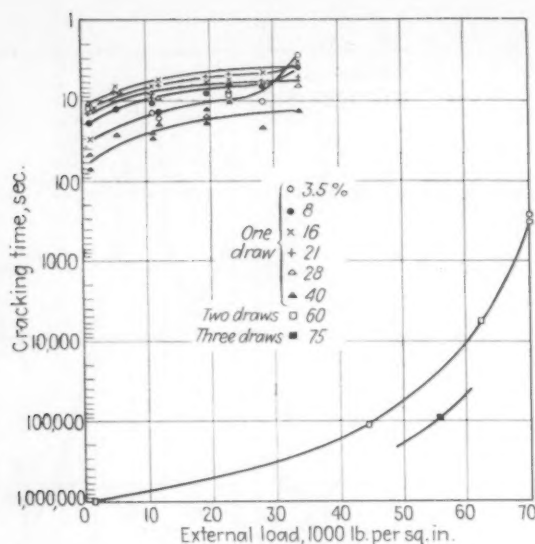


FIG. 11—Effect of external loads on cracking tendency in mercurous nitrate of cold drawn brass wire of various tempers. Diameter = 0.109 in.; previous grain size = 0.140 mm.

the points where the hardnesses and yield strengths reach a maximum. On the contrary, these stresses and resulting tendencies to crack decrease gradually as the temperature changes from somewhere above room temperature to those points at which complete recrystallization is effected.

### Theory

To date, no lucid explanation for the phenomenon of stress cracking can be advanced which covers both the mechanism of corrosion cracking and cracking in contact with a liquid metal. However, it has been shown that the difference in potential between the crystal grains and the grain boundaries has a deciding effect in corrosion cracking. If, by the application of an external potential, the grain boundaries are prevented from being anodic to the grain areas in the specific corroding medium neither intercrystalline corrosion nor corrosion cracking occurs.<sup>29</sup>

Any theory of stress cracking of brass must lend itself to explanation of the most important recognized general features of stress cracking. Among these generalizations are the following:

The presence of grain boundaries is a necessary condition. Single crystals are not liable to stress cracking.

On the other hand, the tendency to crack, or rate of cracking, decreases with decreasing grain size, that is, with increasing area, or perhaps volume, of grain boundary material.

Stress cracking of brass is intercrystalline in nature.

Some chemical reaction must occur between the brass and a second substance. This reaction might be of the corrosive type, that is, presumably electrochemical, or of the alloying type, that is, solution or diffusion of a liquid metal in the brass.

Regarding the cracking caused by mercury or mercurous nitrate solution, it might be mentioned that in spite of the short time of the actual cracking process, the fracture is invariably wetted by mercury.

The tendency to stress crack increases rapidly with increasing tensile stress, present at the surface exposed to the chemical attack.

It appears that a certain minimum value of such tensile stress is required to initiate stress-cracking in brass. On the other hand, with some aluminum alloys which are also susceptible to stress cracking, apparently this occurs also at a very low, or presumably zero, stress.

Stress cracking is not a slowly progressive process, but the actual time involved in developing the crack from its start to its termination is usually very short in comparison to the time of exposure necessary to initiate cracking.

Thus it is quite evident that the nature of grain boundary material is characterized by some factor which favors stress cracking. Regarding corrosion cracking in the presence of an electrolyte, it has been shown that a potential difference exists between the body of the grain and a narrow area which includes the boundary and that

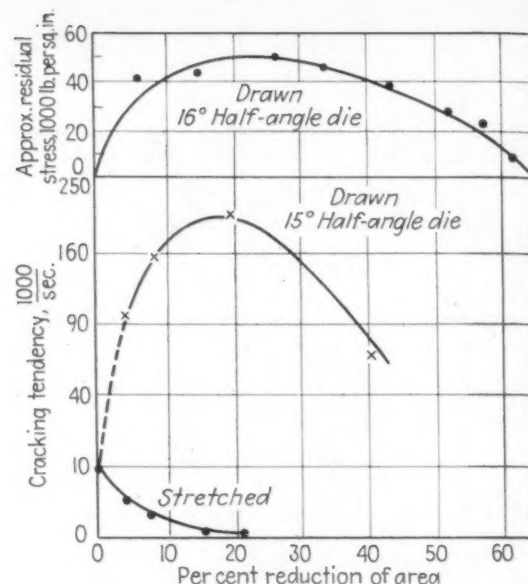


FIG. 12—Effect of various amounts of cold reduction on cracking in mercurous nitrate of stretched and drawn brass wires subjected to 25,000 lb. per sq. in. external load. Diameter = 0.109 in. Compared with residual stress in similarly drawn wire of Linicus-Sachs of 0.118-in. diameter.

under conditions which lead to cracking, the boundary is anodic.

It is rather difficult to apply this conception to stress-cracking of brass in contact with both liquid mercury and mercurous nitrate solution. In this system, several reactions occur simultaneously. Among them are: The solution of copper and zinc in the nitrate, the precipitation of mercury, the solution of zinc and copper in mercury, and the diffusion (solid solution) of mercury into brass. These reactions might have some effect on the stress cracking; however they cannot as yet be evaluated.

Grain boundaries have, according to present conceptions, other properties which favor chemical reactions, such as irregular and loose lattice structure and correspondingly high energies. These obviously should favor the alloying, or diffusion of foreign atoms into the grain boundaries more rapidly than into the grain bodies.

These differences may be rather small and, therefore, not readily confirmed in the absence of tensile stress.

However, the presence of tensile stress further favors the diffusion of mercury into the grain boundaries, because of one or a combination of several of the two following possible reasons: The increase in the atomic spacing at the grain boundaries, or the stress raising effects of the mercury atoms entering into the grain boundaries which might result either mechanically from the formation of a notch, or physically from the increase in volume during diffusion with a re-

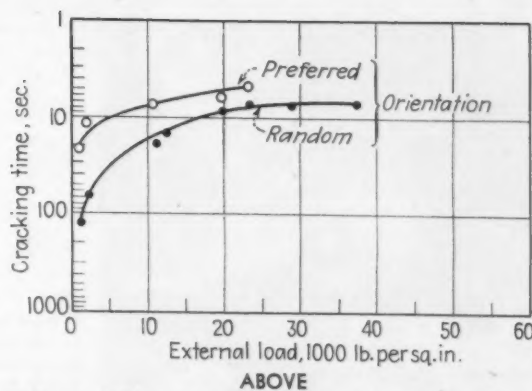
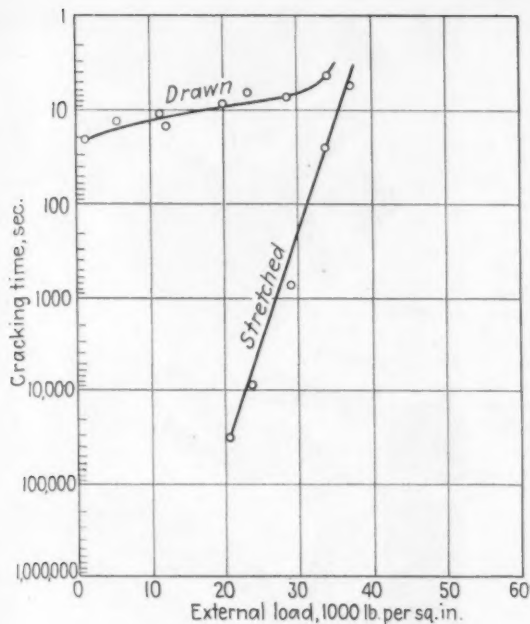


FIG. 14—Effect of impurities on tendency of 70:30 brass to stress corrosion crack. Diameter = 0.109 in.; grain size = 0.140 mm.

FIG. 13—Comparison of cracking tendencies of wires cold stretched and cold drawn 8 per cent from 0.140 mm. annealed. Diameter = 0.109 in.

sulting wedge action in the grain boundaries.

This conception also explains that the body centered-cubic beta brass having a less dense atomic packing than the face-centered cubic alpha brass also possesses a higher cracking tendency.

The knowledge of this subject, however, is not sufficiently advanced to encourage any attempt of quantitative explanation at present.

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FIG. 15—Longitudinal sections used for twin count in determining degree of preferred orientation of 70:30 brass wire. At 75 diameters. Preferred orientation (left), and random orientation (right).



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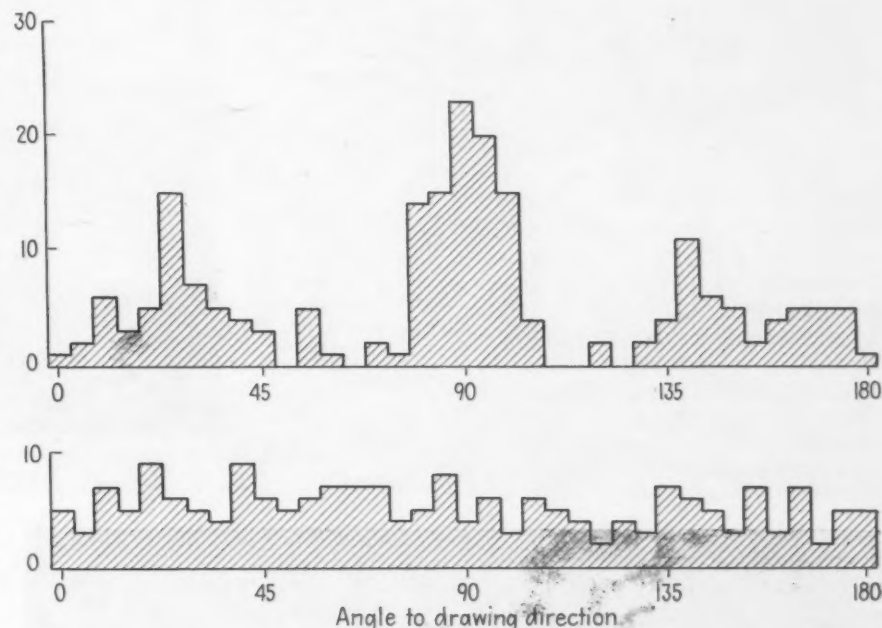
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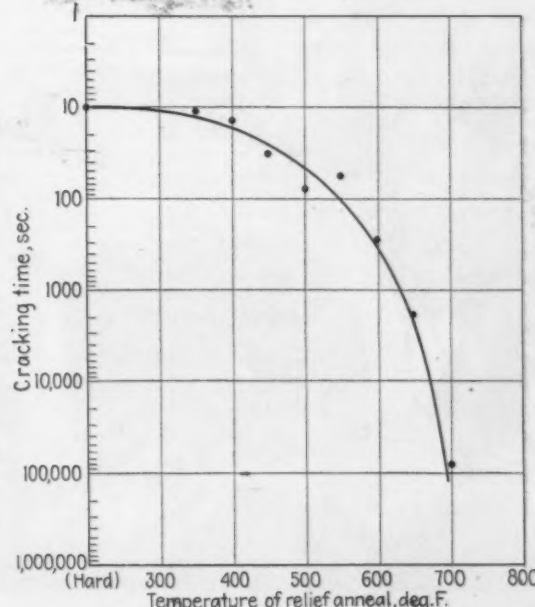
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ABOVE  
FIG. 16—Twin distribution with respect to angle to drawing direction in 70:30 brass wires. With preferred orientation (above), and with random orientation (below).

RIGHT  
FIG. 17—Effect of relief annealing on tendency of 70:30 brass wire of 0.109 in. diameter to crack in mercurous nitrate under an external load of 23,000 lb. per sq. in.; previous draw, 21 per cent.





# Anti-Aircraft Gun Mount Production

**D**ETAILS on gun-mounts for the Navy's rapid-fire 1.1 anti-aircraft guns have been disclosed by the Navy and by Westinghouse Electric Elevator Co., Jersey City, which will soon complete a contract for mount production. The new gun units are now used on every type of American warship.

Weighing 14,000 lb., each mount consists of an adjustable 4-ft. horizontal gun support, installed in an H-shaped stand which is moored to a revolving steel base. Each gun support has four large grooves, 9 x 13 in., into which water-cooled gun barrels are inserted. The four guns, although not synchronized, are fired in nearly simultaneously bursts by a single trigger mechanism on the left side of the unit.

Guided by sights on both sides of the unit, Navy gunners train the guns on flying targets by quickly moving them up or down and left or right. When necessary the entire mount can be swung in a complete circle. The guns are aimed manually by a series of easily turned cranks near the sights, and also by hydraulic power controls which are installed when the gun units reach a ship.

Maneuverability of the mounts depends upon precision manufacturing at extremely close tolerances. This is insured by 4800 inspections during

the manufacturing process, or about six inspections for each of the unit's 800 principal parts.

Principal surfaces must be leveled to a point that engineers call "dead flat," with an allowable discrepancy

of 0.0002 in. Other parts must be accurate within 0.0004 to 0.0001 in.

Just before the gun mounts are ready for shipment, sights that are used in actual combat are installed temporarily and tested for accurate

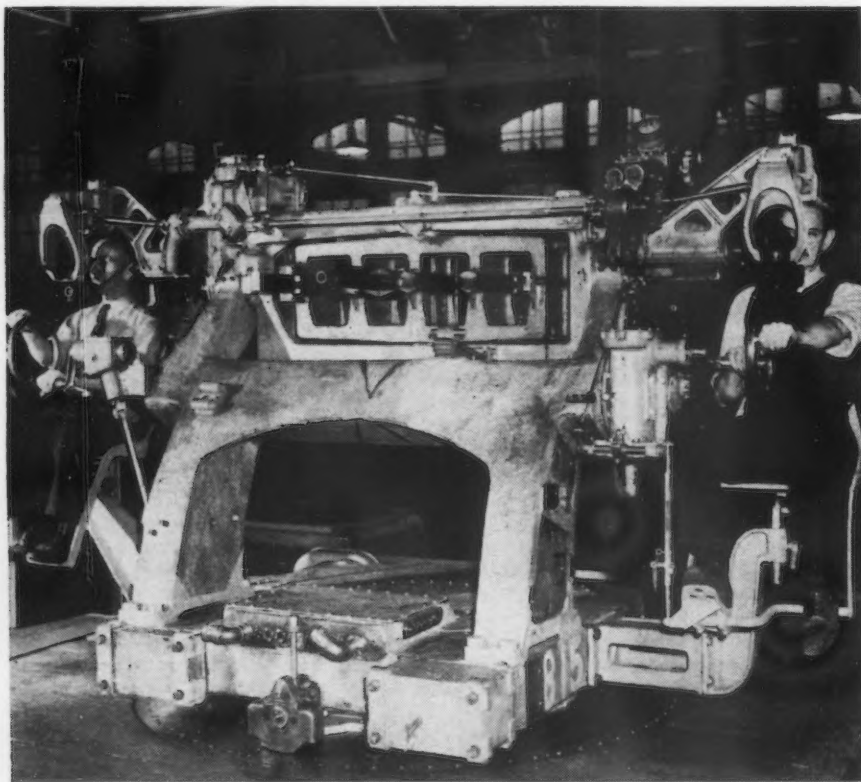
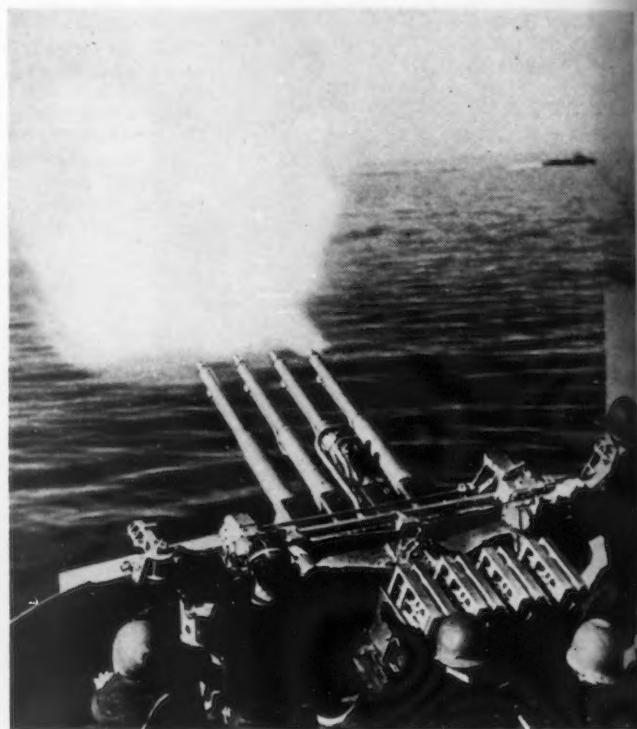
RIGHT

**T**HIS 1.1 in. multiple anti-aircraft gun is reported by the Navy to have played a significant role in the battles of Pearl Harbor, the Coral Sea and the Solomons. The British call it "the Chicago piano."

o o o

BELOW

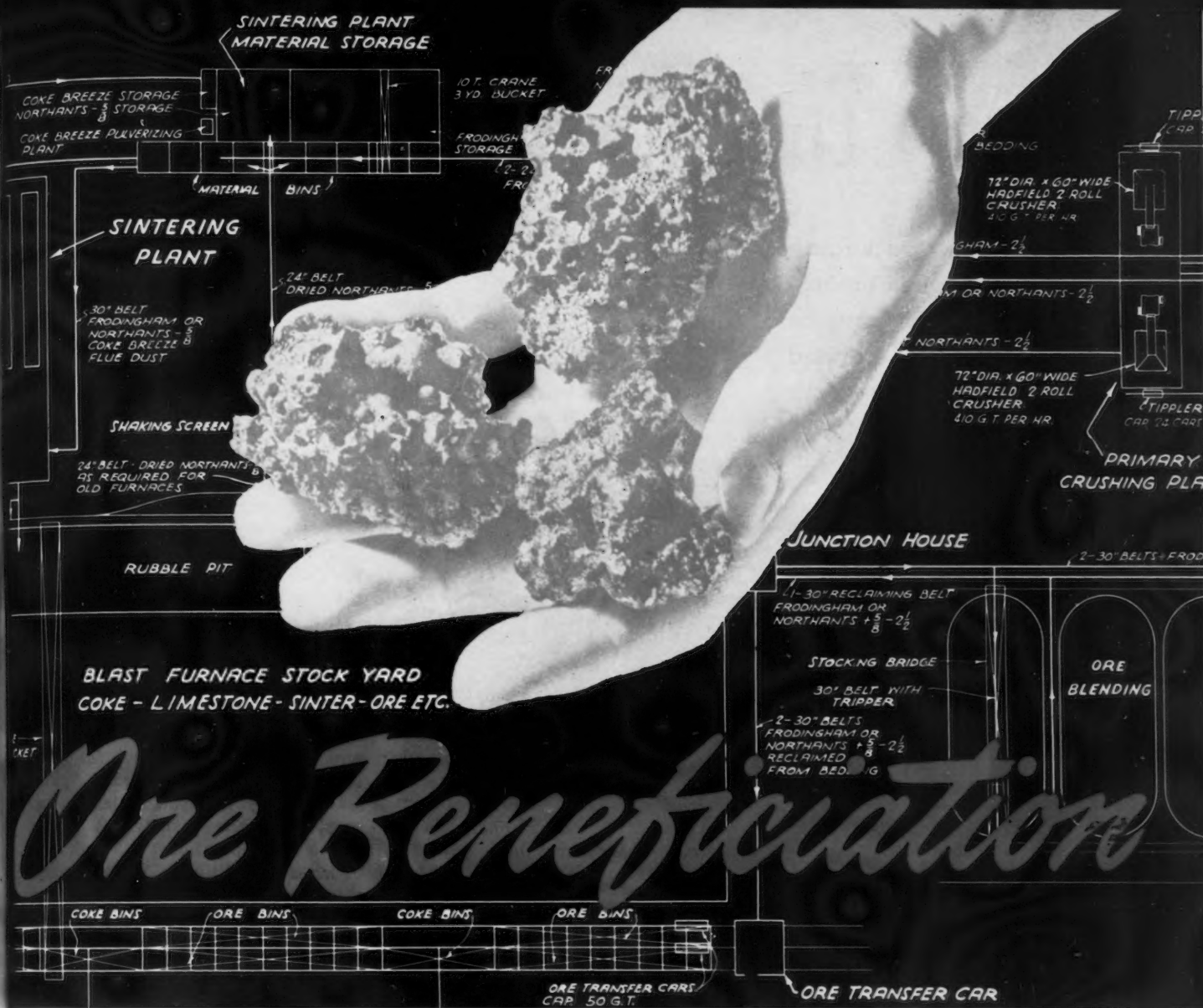
**I**NSPECTORS test gun sights of the mount for alignment with grooves where gun barrels will be inserted.



alignment with gun barrels. Maximum allowable tolerance in this test is 1/60 deg. which would result in a deviation by the gun projectiles of not more than 10½ in. per 1000 yd.

Accuracies required for the units' flat surfaces are too delicate to be achieved by machines, so the required precision is obtained by hand scraping. Tools for production of the gun units were built by the Westinghouse Elevator Co. and other Westinghouse divisions because regular tool manufacturers were overloaded with orders. Some 2000 special tools, jigs and fixtures were turned out at a cost of \$500,000.

In the summer of 1940, each gun mount had required 8500 man-hr. of labor and cost about \$27,000—but assembly line production methods at Westinghouse enabled the company to turn out each unit with about 2100 man-hr. of work at a cost of about \$12,000. By May, 1942, the company was turning out nearly 40 per cent more mounts each month than its contract called for, at a total saving to the Navy of more than \$10,000,000 and 4,400,000 man-hr. of work.



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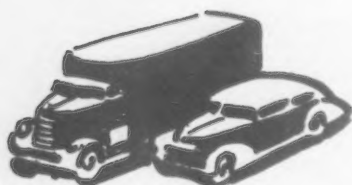
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# Assembly Line . . .

• Ordnance packaging procedure seen enlarging post-war commerce . . . Chrysler credited with pioneering work on the program.



**D**ETROIT—Take an Ordnance supplier and scratch him today, and he might begin to sing this version of Irving Berlin: "I put my part in the Army routine—and every doughboy knows just what I mean."

Putting parts in the Army export routine is something of real significance to any manufacturer in the country who accepts the thesis that the post-war world will be one in which American commerce will stretch out farther than ever before. For Ordnance has devised a packaging

procedure which brings goods to destinations in perfect condition. The importance of Ordnance's developments cannot be understressed if the attitude is taken that the foreign buyer deserves his money's worth in perfectly delivered goods.

To appreciate what Ordnance has done, take a look at the problems. Consider, first, that spare parts shipments for mechanized war equipment are being made everywhere on the face of the globe. Routes are often along alternate and closely jointed belts of extreme heat and raw cold, the best possible setting for condensation of vapor on metal surfaces and the starting of corrosion. Goods are often lashed on deck, as well as stored in holds, doused down with salt water under attack alarm to reduce fire hazard. At the end of the route the crates must often be unloaded by hand onto beachheads, perhaps simply dumped overboard into the water to float or sink until there is time to pick them up. After finally being landed, the parts may have to lie for months before use under tropical sun or arctic frost.

Export men—the kind who know those problems best—wouldn't bet a dime against a dollar a year ago on the chances of a precision part coming through such ordeals recognizable, much less usable. Today they would. The accomplishments of Ordnance make indisputable the claim that the post-war world will see American

goods delivered anywhere as perfectly as if the farthest port were a block's walk from the factory.

Ordnance credits Chrysler Corp. with the pioneering work on the packaging program; other automotive producers have chipped in with their knowledge to perfect the job. Five cardinal principles were set up to work by—protection against the worst possible conditions of atmosphere, conservation of cubic foot space, protection against mechanical damage, setting up of size and weight limitations for facility of handling, and positive identification at the end of the route. All these conditions are satisfied in shipments going forward today.

To do this necessitated the setting up of fairly elaborate factory procedures, starting with special handling of replacement parts, and winding up with actual assembly lines for packaging them. Former systems of parts warehousing were discontinued, and employees were transferred to the new boxing operations; others had to be hired in addition. Conveyor equipment had to be installed to carry out the aim of beginning the packaging procedure at the end of the manufacturing lines and concluding it at the shipping docks. It is a big operation; during a single month one major parts producer used 44,000 lb. of nails, 33,000 lb. of tar, 440,000 board feet of lumber, 975,000 sq. ft. of paper, 72,000 cartons, 408,000 ft. of steel tape and



**END OF THE TRIP:** Weather-protected boxes of spare parts for automotive and tank vehicles are unloaded by troops at a destination point. These packages, as explained in the accompanying Assembly Line, are small enough to be handled without cranes or winches, and in case of necessity can be dropped overboard from freighters and picked up later by small boats at low tide.

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THE IRON AGE, March 18, 1943—71





150,000 sq. ft. of wax-impregnated "non-oxid" cloth.

**B**ASIC procedure consists of a series of operations. First, the parts are cleaned with ordinary mechanical cleaner. They are then dipped into a special coating compound which upon drying may be  $\frac{1}{8}$  in. or more thick. This coating does not have to be cleaned off when the part is placed into use, for its grease base gives it functional lubricating qualities.

After cleaning and coating the parts are wrapped in non-oxid paper cloth, similar to the type used to wrap pipe lines laid in the ground. The wrapped parts are then dipped into a further sealing coat of hot wax.

Proceeding down the "production line" the parts then meet their cartons. The cartons are of cardboard, impregnated with wax for protection and labeled on all six sides for quick identification regardless of how they are stacked. These cartons then go into a wooden box of No. 2 yellow and white pine, nominal one in. size, lined with non-oxid paper. After packaging the covers of the non-oxid liner are joined and sealed with hot wax, and the hinged cover is closed on the box.

Binding with steel tape follows, and the metal identification strip on the outside of the box is fixed. All boxes are fairly shallow, so that no carton lies on top of another and conceals it within the box. When the packing cases are emptied in the field they can be used over and over again for whatever requirements may be found for them.

Each box contains a large waxed cardboard catalog of all the parts to be found therein, this cardboard being a duplicate of the metal plate fixed to the outside, carrying the name and number of the vehicle for which the parts are made, and the names and numbers of the parts themselves.

Each box of a group is numbered from one forward. In one specified box of each lot is enclosed a catalog listing the parts carried in the entire shipment, compiled by cases and alphabetical cross-listing.

This system of boxing actually eliminates the need of a warehouse in the field. The cases can be laid out in numerical order on the ground, and drawn from as needed, inasmuch as they are protected against weather of any type.

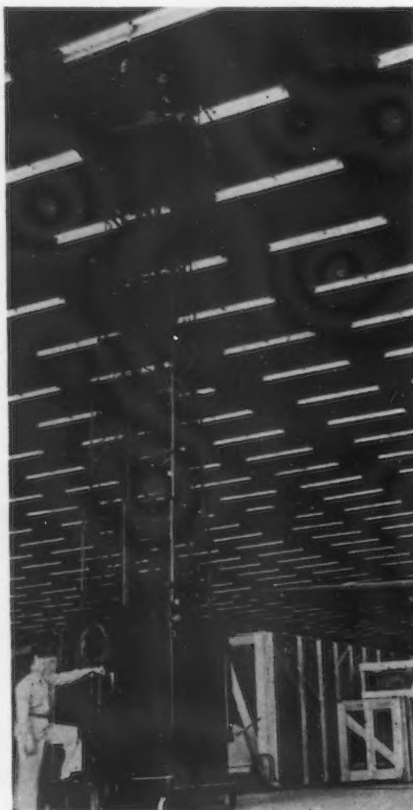
Like most other end-products, the final form and quantity of the boxes represents a compromise, the result of a tug of war between the

Maritime Commission and the lumber yards on the one hand, and the Services of Supply on the other. The Maritime Commission and the lumbermen sought to cut cubical content to the lowest possible level; SOS sought the completest possible assemblies which could be delivered to the fighting fronts.

The first box lot devised by Chrysler originally contained 1800 cu. ft. It was engineered 13 times and reduced to 1200 cu. ft. to contain a group of approximately 35,000 parts weighing 40,000 lb.

This pack is not being used today; other models have brought new requirements, but reengineering toward perfection has gone on. Replacement parts allotments for 100 trucks made by one company, grouped down to about 1200 cu. ft., comprise 35,000 pieces packed in 249 boxes weighing 20 tons. This is comparatively small; another truck's replacement lot consists of 322 cases, with weight up proportionately. A third calls for 460 boxes weighing 50 tons.

In all of these a weight limit of 200 gross lb. applies to each box, along with a size limit of 12 cu. ft., except where the part itself is bigger.



**MOBILE PLATFORMS FOR LAMP SERVICING:** Since traveling lamp-bridges replaced former scaffold methods at the Vega Aircraft Corp.'s plant at Burbank, Cal., lamp servicing is nearly 10 times faster.

**T**HIS system was thoroughly explored before it went into operation last year. Chrysler undertook a dramatic test of the protective processing itself, sinking two boxes of parts in San Francisco Bay, all protected in varying degrees. Boxes were one ft. under water at low tide, seven ft. under at high tide. They remained in the water for 14 days, then were shipped by a hot southern route back to Detroit, a trip requiring 25 more days.

Weighing at Detroit developed the fact that the boxes had picked up 114 lb. of water saturation. Ten days were passed by to permit further deteriorating developments. The boxes were then opened, and the wrapped parts were found to be in perfectly usable condition. Further, the metallic and waxy cardboard labels were perfectly legible, eliminating one of the prime worries of Army people.

Industry is learning some lessons out of this program for post-war use, aside from the means of protecting shipments. Primary is the fact that identification of parts by box number, and shipment in weatherproof containers, promises a solution to the problems encountered by distributors who carry large stocks, of locating and spending money for warehouse space. Such shipments may be stored in the future on the roofs of buildings or even in nearby acreage, inasmuch as they would be easy to get at and would withstand the ravages of interim weathering. Automobile companies confidently expect that they will utilize some of these packaging methods and systems when peace returns.

The Ordnance department is figuring in another interesting offshoot of automotive news this week. It is utilizing idle automobile haulaway trailers by converting them to buses, carrying war workers and Army personnel in areas where depots, arsenals and war plants are located, and moving troops.

Converted, the trailers carry from 80 to 100 people through addition of bodies fabricated largely from non-critical material—masonite and plywood for the most part.

Reconditioning of the haulaway units for their new work helps the salvage program as well, with approximately 1000 lb. of steel taken from the framework for scrap. Some 1500 of these vehicles are earmarked for conversion to buses, with the work done by approximately 30 small body builders throughout the country.

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...to check on the steel  
before hardening tools



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To avoid such difficulties, you will find *spark testing* a handy way to identify tool steel—whether you want to separate mixed tool steel stock, to check on the steel before hardening tools or to segregate tool steel scrap. True, spark testing doesn't

give the information of a chemical analysis, but it provides a *quick check* on the identity of the steel.

To help you develop more fully the possibilities of spark testing, we have prepared a "Guide for Spark Testing Tool Steels" in the form of a convenient 21" x 30" wall chart. It shows the characteristic sparks of the Carpenter Matched Tool Steels, including High Speed. It explains the effect that the different alloying elements have on the spark patterns. It also contains complete information on spark testing procedure—how to test most effectively, etc.

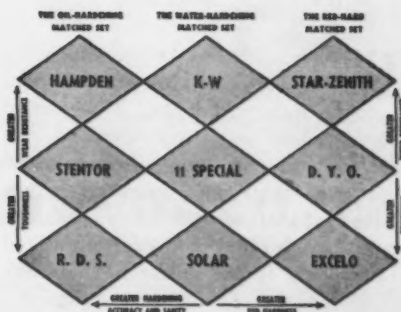


Used as a guide, this chart can help you train your men to quickly identify tool steels. It's offered free to tool steel users in the U. S. A. If you do not already have a copy, a request on your company letterhead will bring it to you.

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# Washington

• **Maritime Commission's February ship-building record possibly marks end of steel shortage era . . . Record disagrees with Truman report . . . Plate output 2½ times Commission's needs.**



**W**ASHINGTON—The Maritime Commission's recent announcement of an all-time record in the delivery of 130 ships in February was interesting and important not only for what it said but also for what it did not say. For the first time since it entered upon its war construction program the Commission made no mention of a shortage of steel. Hence the announcement seems to mark an end of an era.

Probably no Government bureau has equaled the Maritime Commission in its intensive and persistent complaint about the shortage of steel or brought more pressure upon WPB for steel allocations. That is saying a great deal, for other agencies, such as the Army and Navy, have played strongly on this chord. They have had unbounded support in a chorus from Congress.

"Shortage of steel" had almost become a national slogan to explain away all sorts of shortcomings in the rush to build up in a short time a much needed and vast war machine to overmatch such a machine built up by the Axis powers over a decade.

**T**HE zeal of these tremendously important agencies to get vital steel is easily understandable. It reflected a realization on their part of the responsibilities resting upon them. So great was their determination to get steel that they in reality competed against each other and each appeared to be trying to out publicize the other in raising the cry of steel shortage.

Deciding the quantities and deliv-

eries of steel for such agencies, whose performance can determine the very life of a nation, is a difficult and heavy responsibility. There have been shortages of steel, as might be expected when demand is so concentrated and great. There still are "bottlenecks."

As an over-all service, steel distribution has been remarkably equitable. Conversion and rapid increase in capacity and production have established notable records, as the Truman Committee has conceded. On the other hand, complaints of shortages of steel in many instances have been sharply challenged. This has been true with respect to complaints from the armed services and the Maritime Commission.

From both the WPB and the steel industry contention has been made that out of eagerness to get steel they have built unnecessarily big stocks. Certainly as between having too little and too much they should by all means be allowed to accumulate an excess. Yet if supplies are too great, demands from other sources are perforce

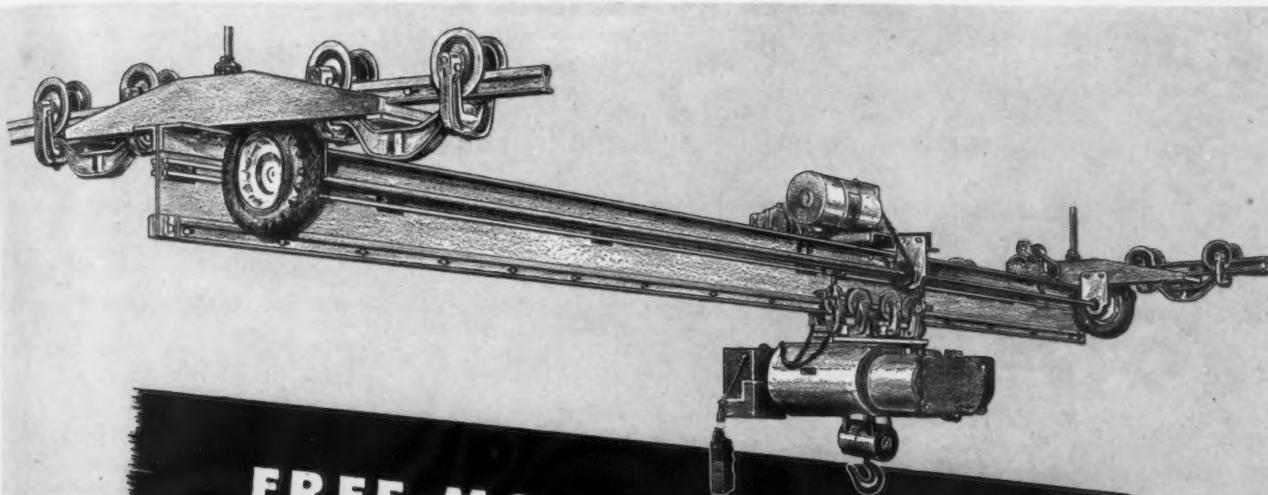
scaled down with consequent injury to the war effort. And the feeling is that especially in the case of plates unnecessarily high inventories have been piled up in some shipyards.

**E**VEN if the Maritime Commission was not overstocked at least its report on February ship deliveries definitely showed that its big appetite for steel was finally satisfied. This record was in direct disagreement with the Truman report, issued in February, that "the Maritime Commission cannot get steel for ships."

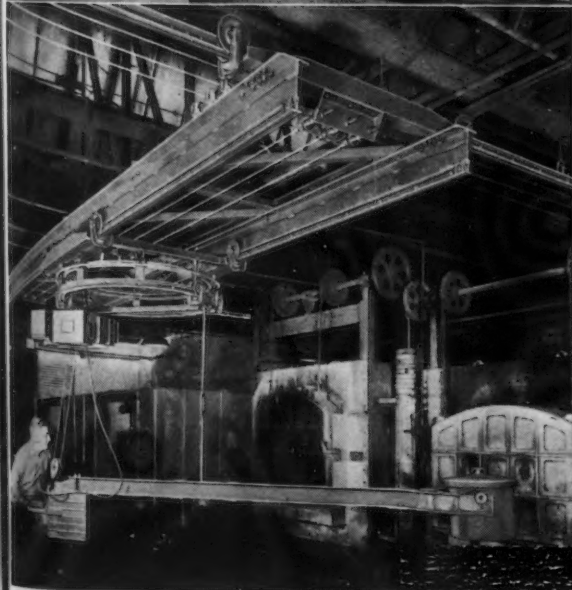
Admiral Land, chairman of the Commission, who often has complained that steel shortage has held down ship production, has a construction goal of 18,000,000 tons for 1943 under a White House directive. He said that the Commission can exceed that goal by 2,000,000 tons if he can get the steel. It looks as though the Commission now is on trial for, unless the unexpected happens, it will get all the steel it needs. Roughly 20,000,000 deadweight tons of ships will require approximately 7,000,000

**TOJO EGGS:** The Thermador Electrical Mfg. Co. turns out bombs, shell cases and other munitions for the Navy. In this photo, more bombs for Tojo's minions come down an endless production belt in the Thermador plant. Freshly lacquered, the sea-air-going 'eggs' march between banks of infrared drying lamps.





## FREE MOVING CRANES AID WAR WORK



### Flexible Design Permits later adaptability to regular production

Every American MonoRail System must be "made to order" and yet, these "tailor-made" systems are made from standard parts. Because of its extreme flexibility, American MonoRail offers a wide range of application without costly adjustment or lengthy engineering.

American MonoRail Cranes have proved to be invaluable in hundreds of installations. With the structural design greatly simplified, dead weight of the crane bridge is kept at the lowest point consistent with strength. This provides maximum live load capacity and requires less effort to move. Elimination of friction at all points by the scientific use of proper bearings make American MonoRail cranes the easiest of all to handle.

Let an American MonoRail Engineer consult with you.



WRITE FOR Blue Book  
illustrating hundreds of  
MonoRail installations.

Standard Crane Parts assembled into special unit at low cost to meet unusual production requirements.

## THE AMERICAN MONORAIL CO.

13103 ATHENS AVENUE

CLEVELAND, OHIO



tons of steel, of which about 5,500,000 tons would be plates.

Certainly the Maritime Commission has fared generously in getting steel for its ships. Both within the government and the steel industry there is a definite conviction that it has received more than its share. Charges are made that the Commission has hoarded steel. To support this contention figures have been cited to show that since October, 1941, the Commission has been given about 4,500,000 tons of steel plates. Converted into 10,000-ton Liberty ships, the principal type the Commission produces, this would be sufficient material to build about 1600 vessels. Commission deliveries are reported to be something under 900 ships, whereas its steel supply has been sufficient to build about 1600 ships. On this basis the Commission would have an enormous stock of approximately 2,000,000 tons of plain and fabricated plates, which, it is insisted, constitute a huge excess of necessary inventories.

Thanks to expansion of capacity and conversion, plate production has risen tremendously. At present plate output is at the rate of about 14,000,000 tons annually, equal to almost two-and-one-half times of the Commission's requirements to build 20,000,000 deadweight tons of ships.



British Combine

**GERMANY'S NEWEST:** One of Germany's latest operational aircraft is the Messerschmitt ME 210, a two-seater fighter bomber. It is a development of the former ME 110 but it is very different in appearance. The ME 210 is fitted with 208-601 engines of 1395 hp. each and has a top speed of about 365 m.p.h. The armament consists of six guns, including two cannons in the nose and two others in small side turrets.

## DPC Grants Columbia Steel Additional \$12,500,000

Washington

• • • Announcement has been made that the DPC has increased by \$3,300,000 its contract with the Colum-

bia Steel Co. to provide additional facilities at plants in Utah, resulting in an over-all commitment of approximately \$12,500,000. The nature of the additional facilities was not disclosed. Other DPC contract authorizations during the past week include:

Fairchild Engine & Airplane Corp., New York, to provide additional machinery and equipment for a plant in New York at a cost in excess of \$750,000, making a total commitment of more than \$8,900,000.

General Electric Co., Schenectady, N. Y., to provide additional plant facilities in New York at a cost in excess of \$460,000, making a total commitment of more than \$3,880,000.

Auto Specialties Mfg. Co., St. Joseph, Mich., to provide additional equipment for a plant in Michigan at a cost in excess of \$80,000, making a total commitment of more than \$3,580,000.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., to provide additional equipment for a plant in Wisconsin at a cost in excess of \$315,000, making a total commitment of more than \$2,300,000.

Interstate Aircraft & Engineering Corp., El Segundo, Cal., to provide additional facilities in Illinois at a cost in excess of \$220,000, making a total commitment of more than \$910,000.

Clifton Products, Inc., Painesville, Ohio, to provide plant facilities in Ohio at a cost in excess of \$210,000.

Rheem Mfg. Co., South Gate, Cal., to provide plant facilities in California at a cost in excess of \$200,000.

Westvaco Chlorine Products Co., New York, to provide plant facilities in California at a cost in excess of \$230,000.

Branch Motor Express Co., Allentown, Pa., to provide facilities in Pennsylvania at a cost in excess of \$120,000.

## THE BULL OF THE WOODS

BY J. R. WILLIAMS





## *"Quality* COUNTS EVEN MORE THAN QUANTITY"

That's what experience on the fighting front has proved, as Donald Nelson recently told newspaper men in Philadelphia. Under stress of battle, quality is of vital importance in guns, tanks, ammunition and planes.

It is up to American industry to maintain the highest uniform quality in these war materials for our fighting men.

While machine tools assure quantity—QUALITY can be obtained only by proper dimensional control through the use of reliable precision gaging equipment.

\*

*Sheffield's specialists in Dimensional Control are authorities on maintaining uniform quality in manufactured parts.*

\*

**THE SHEFFIELD CORPORATION**  
DAYTON, OHIO, U.S.A.  
*Specialists in Dimensional Control*




# WEST COAST . . .

• **San Francisco central steel warehouse inventory assures stocks . . . Maritime Commission alters fabrication rules following tanker break-up . . . Aircraft wage ruling modifies "Little Steel" formula.**



**S**AN FRANCISCO—Clearing house methods long followed by banks in the nation's financial centers will have their counterpart here with inauguration of the Central Bay Area plan for a master inventory of steel stocks held by warehouses and large industrial plants.

When the plan is put into actual practice, probably about one month hence, a prospective steel purchaser who finds that his usual warehouse supplier is unable to furnish the item he needs, will be referred to the central inventory maintained by the War Production Board, San Francisco office. Maintenance of this inventory up-to-the-minute, in which lies its great chance for success, will be achieved by daily clearings of perpetual inventory records maintained by the 25 warehouses and large industrial firms whose stocks will be made available to the public. Considerable standardization of records and paper work, both on the part of the warehouses and the WPB, will be involved, but everyone concerned agrees the effort will be worthwhile.

Following the close of each day's business, a participating warehouse will tally up the effect of transactions upon its stocks, and prepare an inventory report. Motorcycle couriers will pick up the reports of the participants, deliver them to the War Production Board, and that agency will set about preparing its master inventory for the next day's business.

To insure practical operation, warehouse representatives have worked and will continue to work in close conjunction with the WPB, with an

advisory board set up for consultation as to policy and operation.

Although no official announcement has yet been made, the banner attraction is a provision which will provide against depletion of vital items throughout the area. WPB Regional Director Harry H. Fair, whose dynamic enthusiasm has contributed greatly to selling the plan to Washington, D. C., bigwigs, will be empowered to recommend increased quotas necessary to maintain stocks sufficient to supply essential industry demands.

Present quotas governing receipts by steel warehouses have been particularly unsatisfactory in this area, as in other war boom areas, because of the almost explosive industrial expansion since the pre-war period on which they are based. Total steel stock available were severely slugged by the abandonment of San Francisco mill stocks by Bethlehem and Columbia, who formerly maintained an average 200,000 tons of steel by which warehouse stocks could be supplemented. The warehouses estimate that at present only 50 per cent of inquiries can be filled from stock.

When the warehouses have finished boning up on the operating intricacies of the plan, its actual direction will be turned over to William Cloos, regional WPB Redistribution Division chief, who has built up a reputation for level headed administration of his department. A majordomo to be directly responsible for the plant's operation is yet to be chosen.

**D**ESPITE the tremendous growth of Kaiser-operated Maritime Commission yards at Richmond, Cal. (more are employed than worked a few years ago in all industry in the east San Francisco Bay area), labor still is being recruited. These yards have been particularly partial to women, choosing them in preference to beardless youths, which are the alternative labor supply. As many as 400 newly trained (three days) welders descend weekly upon a single unit of the Richmond confederacy and are put to work on sub-assemblies and burning under the watchful eye of instructors.

Total personnel of these yards is distributed approximately 50 per cent on the day shift, 30 per cent on the swing shift and 20 per cent on graveyard. This distribution is maintained with the growth in total per-

sonnel as representing optimum efficiency.

Current production goal of these yards, one of which turned out the famous four and one-half day Liberty ship, is one Liberty per way per month, so that no Liberty would be on a way more than 30 days.

Production is also gaining speed at the Permanente Magnesium plant, heretofore the black sheep of the Kaiser string. Figures are, of course, strictly taboo, but the sky is brightening for meeting production schedules on the light metal, never the case heretofore.

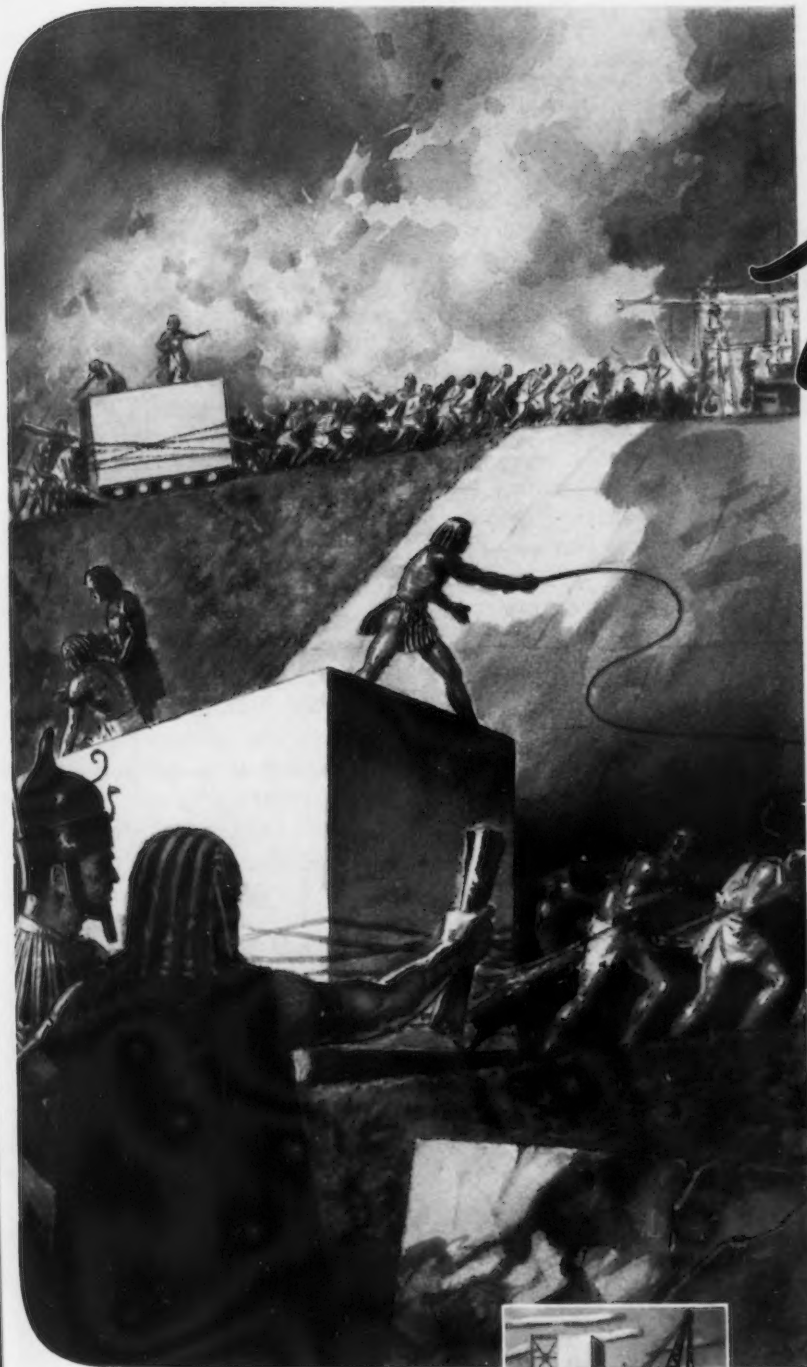
**B**OEING AIRCRAFT CO. has dedicated a new high speed wind tunnel and aeronautical research laboratory to Edmund T. "Eddie" Allen, ace test pilot and research man, who, with 10 associates, were killed when a giant Boeing built bomber, on a test flight, crashed into a Seattle cannery last month. To the Boeing organization, however, Allen's real memorial will be mass production of the bomber model he was flying at the time of his death (no official announcements have stated it was a Flying Fortress), enthusiasm for which has in no way been dimmed by the unfortunate accident.

**T**WO weeks after the War Labor Board decision setting wages and job classifications in nine West Coast airframe plants to the severe disappointment of workers, production was on a normal scale. Despite a certain amount of griping, with hometown politicians promising to intercede with their pal, F.D.R., the bulk of the labor force swallowed the bitter pill with a shrug and went back to work without even whispering "strike."

When the history books are written, the WLB decision will be noted, not for all the furore it caused, but because it represented one of the first decisions to take into account "take home" wages rather than the average hourly rate in following the "Little Steel" yardstick.

Every worker with at least 12 weeks' experience in the southern California plant will receive a minimum of \$39 per week. This minimum is based on a 48-hr. week on the day shift, with 8 hr. overtime pay, which is the normal current work week. This average earning, compared with June, 1941, average earnings for sim-

# MONUMENTS TO *Muscle*



Built to honor Pharaoh, the pyramids of Egypt are, more than anything else, monuments to muscle. Unaided by engines, men moved huge blocks of stone weighing 50 tons and more into their proper places. To raise these stones so far above ground level, workmen had to construct—and afterwards completely remove—earthen ramps thousands of feet long, up which they pushed and pulled the tremendous loads.

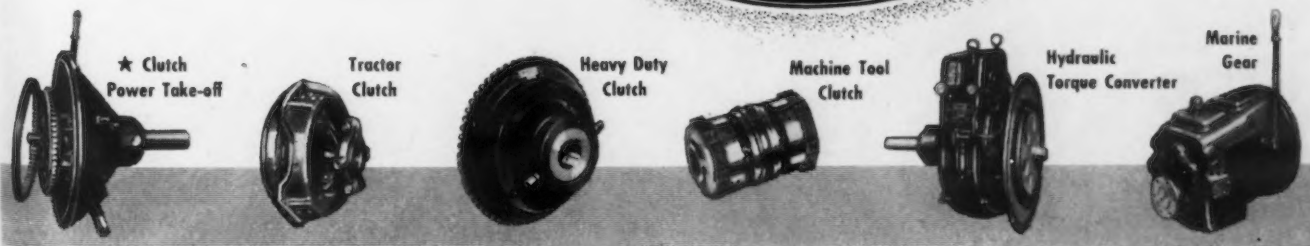
Since Pharaoh's time, the search for mechanical power and better ways of applying it has gone on unceasingly. For the past quarter century, the Twin Disc Clutch Company has contributed to one phase of this search—the application of industrial clutches. As a result of our constant program of research and development, Twin Disc is a familiar name in the oilfields, in the logging camps, in agriculture and in various material handling equipment as well as in land and water transportation.

Each day still brings new problems involving the linkage of driving and driven units. Helping to solve these problems remains one of our major responsibilities even though today our production facilities are largely devoted to supplying war needs.

We invite manufacturers to draw on our quarter of a century of experience in designing and building clutches to fit a variety of jobs—to assure still better performance in the new products now under consideration. TWIN DISC CLUTCH COMPANY, 1402 Racine Street, Racine, Wis.



*Twin Disc Power Take-Offs\* transmit the power which enables modern cranes to handle enormous loads. Smooth operating heavy duty friction clutches, enclosed in housings, deliver full torque and horsepower.*





ilar work, meets the "Little Steel" yardstick, although the hourly wage rates approved in the decision fall far below.

One of the completely unpublicized aspects of the decision is the part played in its formulation by Almon E. Roth, president of the San Francisco Employers' Association and undoubtedly the best known representative of Far Western industry in labor negotiations. Roth, it will be recalled, wrote the minority report for the WLB panel which last fall recommended a raise in wages of non-ferrous miners in the West far in excess of the "Little Steel" formula. Though Roth's name never was mentioned in connection with the aircraft wage hearings, his influence evidently counted heavily.

Organized labor, insofar as responsible leadership on the West Coast is concerned, is anxious to hold its equal representation on the War Labor Board, no matter how unfair any single particular decision may be, for that body is the only one in which union representatives have an equal voice. All eyes here are on the Appalachian Coal Conference, which to the union working man will be a test of whether John L. Lewis can successfully defy the authorities of the WLB. Labor leaders here, however,

will do everything they can to hold their followers behind the board.

**C**URRENTLY in the works in the San Francisco Bay area is a plan to set up a joint labor-management committee to control inter-plant migration and secure a voluntary anti-piracy agreement. To leave any company to work for another in the same industry, it would be necessary to secure a clearance from the company labor-management committee. A general committee, either representing the industry or representing the area, would have to grant clearance to anyone leaving one industry for another.

Although the objectives are undoubtedly worthy, the whole scheme smacks of a similar program inaugurated here several months ago, and heralded as a possible model for other industrial centers if it was a success. After a short trial, all talk of copying the plan elsewhere was dropped. A similar scheme recently inaugurated in southern California is meeting a similar fate. Impartial observers are almost thoroughly convinced that any scheme confined to a single area, without strong means of enforcement, will not succeed.

## Blade Painting Time Cut by Nash-Kelvinator

Detroit

••• Innovations in the propeller division plants of Nash-Kelvinator Corp. have increased output in the propeller blade painting department by more than 400 per cent. Average time for painting and drying has been cut from 40 min. to less than a fourth of that time, and the final 48-hr. drying period formerly required has been eliminated.

Blades are now cleaned in a trichlorethylene vapor degreaser system which heats them as it cleans. They are hung butt end up in a metal mask on a pusher-type monorail conveyor and lowered in the degreaser, eliminating much handling formerly required and cutting out previously needed masking operations. They are then transferred to a power conveyor, and the primer and yellow tip are sprayed on groups of blades at once. After passing through an infra-red oven, the blades are ready for masking of the yellow tip and the standard coat of black lacquer. Batteries of infra-red lamps are used to eliminate the former final drying period.



Press Assn.

**PACKING AWAY A JEEP:** Uncle Sam's big gliders can take a jeep aboard just like this. Here a jeep is backed into a glider under its own power as part of the training for glider pilots at the Army's glider training school at Victorville, Cal. As pictured here the nose of the glider lifts up to allow the jeep to be tucked in.

RIGHT

**ALL ABOARD GLIDER:** A jeep with five men fits snugly into a glider as student glider pilots at the Army's flying school at Victorville, Cal., learn new wrinkles in mass air transport. Jeep along with its crew roll in through the nose section of the glider, and can roll out just as quickly.



Wide World

# VICKERS

## HYDROMOTIVE CONTROLS

*Make it  
Easy*

### FOR WOMEN OPERATORS



**T**HE rapidly increasing number of women workers on jobs normally done by men makes it necessary that machines now be engineered for women operators. There must be no heavy controls requiring brute force . . . women do have physical limitations.

Vickers Hydromotive Controls make this engineering easy. They're light—respond to the touch of the daintiest fingertip. They provide simplicity. Complex operations can be reduced to an easily grasped routine or to a completely automatic operating cycle. Positive and automatic overload protection is provided; controls can be interlocked so that work and machine cannot be damaged—

and possibility of injury to operator is very remote.

Such engineering not only makes machines more efficient with women operators—it also improves production with men operators. Let Vickers Application Engineers discuss with you the possibilities of improved machine controls.

**VICKERS** Incorporated • 1420 OAKMAN BLVD. • DETROIT, MICHIGAN

Application Engineering Offices: CHICAGO • CLEVELAND • DETROIT • LOS ANGELES • NEWARK • ROCKFORD • TULSA • WORCESTER

**Representative of More than 5,000 Standardized Vickers Units  
for Every Hydraulic Power and Control Function**





# Fatigue Cracks

BY A. H. DIX

## The General Said to Us

••• We went to Washington last week, with other members of the Fourth Estate, to get the lowdown on the war straight from the generals' mouths. We wish we could whisper from the side of our own, "Don't let this go any further, but Lieut. Gen. Somervell told us the other day. . . ." The fact is that we can speak freely, as the generals proved that they can keep a secret.

Although we could have learned much more about the progress of the war by staying home and reading the *New York Times*, we are glad we went. For otherwise we would not have been able to tell you that the morale of the bestarred gentlemen is about 500 per cent higher than it was a year ago. They exude confidence at every pore, and it is all the more comforting because complacency seems to be absent.

*Another thing that impressed us was the absence of slap-the-Jap, stun-the-Hun talk. The patriotic tremolo stop wasn't pulled once. The military seems to feel that if a man is busy enough at his job the emotional shot in the arm is more likely to act as a brake than as an accelerant. This is another way of saying that as a morale builder there is nothing like pride in work. And as pride in work is usually proportionate to skill, morale then becomes a matter of training.*

We had always thought that top military men cast their convictions in quick-set cement. But apparently that model went out with wrap leggings. Today's cerebral military equipment seems to be a mind as flexible as an anti-dive bomber gunmount. The brass hats we saw gave the impression that they would snap up a good new idea as fast as a hungry hawk swoops down on a prairie chicken.

So we will toss a clay pigeon of our own into the air and see what happens:

*As the military knows, the training schedules at some camps are excellent, but at others (all we know is what we read in the soldiers' mail) the man-hours wasted run into light years. The cure, of course, lies in getting the right men into the key jobs. Our suggestion is that the Army pin eagles on Doctor Gallup's shoulders and put him at the head of a corps of trained investigators, reporting direct to headquarters.*

*We don't put much stock in the inspections made by visiting brass hats, as the dates of their calls are usually known well in advance, and the camps usually have time to put on a special show. Investigators get best results when they drop in casually, like bank examiners.*

## Retreat with Honor

••• Another thing that struck us about the Army's big shots is that they aren't stuffy. One of the top rankers in the Ordnance Department said, "You can now fire questions at me. If you ask me one to which I don't know the answer, of course I'll tell you it's a military secret."

## Ordnance Orthologist

. . . I note from your current issue that General Motors is going to produce a "carbine rifle." I suppose they will figure the measurements with a 12-in. foot rule. A carbine is a rifle—a short one.

And be sure to call it a carbeen. Saying carbyne is as bad as calling a platoon a plat-toon instead of a play-toon.

—Deac

The dictionary gives "carbyne" as the sole pronunciation. That's the way they say it at Aberdeen. We never heard platoon pronounced play-toon. Deac must have gotten in with the "Dead End" set.

## Vital Statistic

••• Trick birth announcements usually leave us cold, but we are warmed by one sent out by Bob (Dumore Co.) Hamilton. It is in the form of a theater ticket for the howling success, "Ten Nights in a Maternity Ward," presenting a new star, Richard Matthew Hamilton; producer, Mary Hamilton; casting director, Bob Hamilton; costumes subject to change.

## One-Eyed Jacks Wild

••• One Buffalo operator reports that one of three one-eyed workmen in his yard has been classified as A-1.

—*The Iron Age*, Mar. 11, page 148

Thus ruining the gag that draft board doctors no longer test eyes but merely count them.

## Business as Usual

••• Bell Tel, which is paying out good money to discourage the public from using long distance lines for other than essential calls, ought to fight things out with the management of El Cortez, San Diego, Calif., hotel. Frank Oliver, of the brains department, who recently stopped there, was handed a card beseeching him not to use long distance "just for emergencies," but also to "Give pleasure to relatives—extend greetings—keep in touch with friends."

## Sure Hand on Bitters Bottle

••• Humor in advertising, if handled ineptly, is as out of place as a narrow-brimmed fedora in Harlem. But if administered deftly it points up the sales arguments as a dash of bitters does an old-fashioned.

Most expert user of humor in industrial advertising is, in our opinion, the writer of advertisements for Desoutter, English manufacturer of portable tools. We have never seen a Desoutter adv. We could resist reading from headline to signature. The latest, based on an admittedly untrue testimonial, begins:

"Sir, I work in an airplane factory and spend most of my day drilling holes. I found my work very boring. . . . I frequently groaned at my work from the pains in my wrists. . . . I grew very depressed. . . . I persuaded my chargehand to get me one of them Dusutter, Dosooter, Dusouetir—to get me one of your drills, Sir. . . . I now do twice the work in half the time and instead of groaning I sing. . . ."

## Suppressed Desires Gum Up Keyboard

Did you see this in the New York World-Telegram?

One airplane stop has coined classifications for its women workers, including mechanettes, weldistes, and riveteuse.

—C.R.M.

"Mechanette" is Lockheed's invention; "weldiste" and "riveteuse" are ours. But "airplane stop" is the *World-Telegram's*. What it means we have no idea—probably a typographical error for "airplane plant."

Mistakes are manifestations of subconscious desires, and what caused the substitution of "stop" for "plant" is locked in the cerebellum of a *World-Telegram* line operator. But the reason for some "typoes," as they are known in the trade, can easily be seen. Take, for example, this sentence that "Anon" of Newark saw in a chemical journal:

. . . when mixed with insecticides the resulting solution makes easy kills of adult Japanese.

Wish fulfillment caused the dropping of the concluding word "beetle."

Then there is the kind of error made by linotypers who subconsciously long for the good old days. Archie (Westinghouse) McGillivray supplies an example of this, clipped from the *Pittsburgh Press*. The answer to the question, "How large is the membership of the American Legion?" was given as:

In July, 1492, there were 1,107,876 members.

## Puzzles

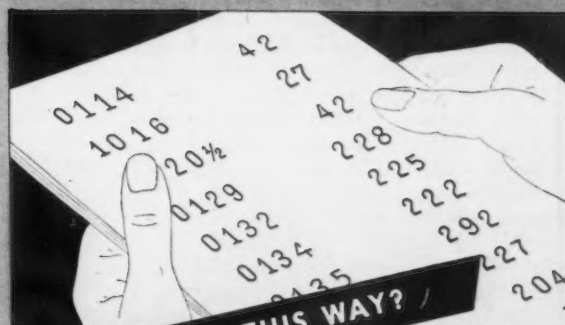
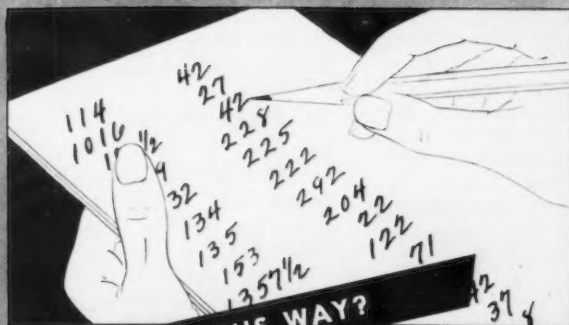
••• The answer to last week's is .490977 in.

E. N. Yeager, of Napoleon Products Co., Napoleon, Ohio, is responsible for this. If you can figure it out in 7 min., using only paper and pencil, move up to the front row:

The 13 cards of a suit are arranged in a pile, faces down, so that if alternate cards, starting with the first, are exposed, the cards will appear in numerical order. The second, fourth, etc., are placed on the bottom of the pack. How are the cards arranged?

# How Are **W**eight **R**ecords

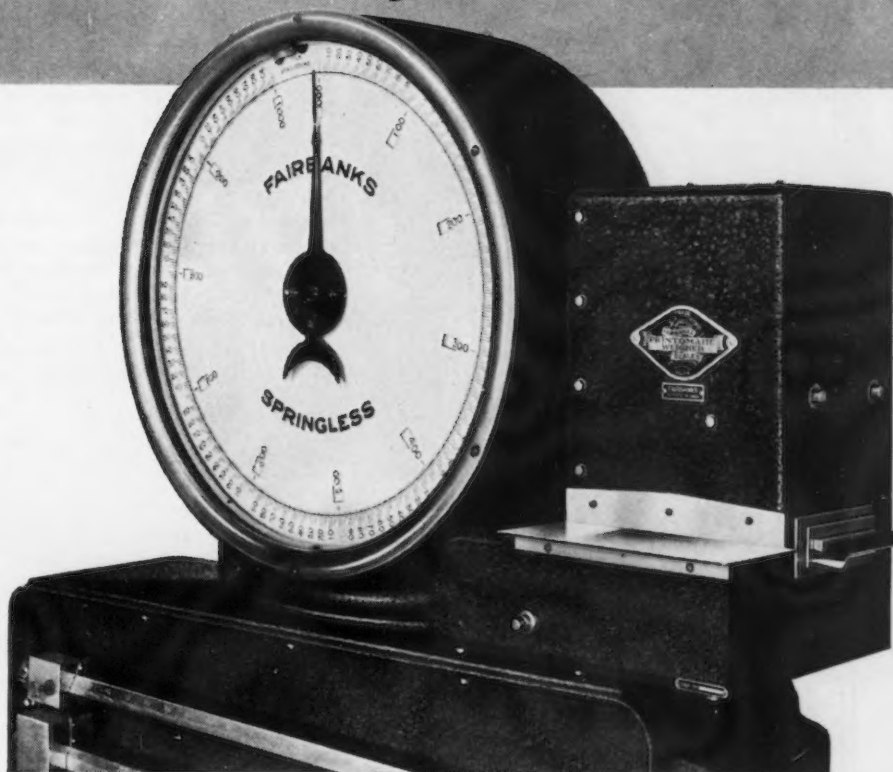
## Made In Your Plant—



### For precision weighing and precision recording use Fairbanks Scales with Printomatics

• Of course, *sustained accuracy* in the weighing machine is vitally important. But no matter how accurate the machine is, unless weights are *accurately recorded*, the element of error still remains.

Fairbanks Scales with Printomatics eliminate these human errors—because the scales read the weight automatically and then automatically make a *printed* record of the weight. In addition to eliminating errors, Fairbanks Scales can be fitted into your production flow to do a variety of jobs better than they can be done in any other way. Fairbanks Scales weigh loads in motion . . . count small parts . . . record the flow of liquid chemicals . . . guard secret formulas in compounding . . . control batching . . . automatically control ingredients . . . automatically control aggregates . . . and many other jobs.



The organization which made Fairbanks the greatest name in weighing brings you 113 years of scale manufacturing experience. That, too, is worth serious consideration.

Fairbanks, Morse & Co., 600 S. Michigan Avenue, Chicago, Illinois.



## FAIRBANKS-MORSE

DIESEL ENGINES  
PUMPS  
MOTORS  
GENERATORS  
SCALES

WATER SYSTEMS  
FARM EQUIPMENT  
STOKERS  
AIR CONDITIONERS  
RAILROAD EQUIPMENT



# Scales



# Dear Editor:

## LABOR SHORTAGE CURE

Sir:

Are factory managers really in earnest about wanting to employ women who have never worked in plants before? I live in an industrial section in lower Connecticut. The youngsters who went to school with my children are always talking about getting jobs in plants. But this is what happens to them: spent a precious gallon of gasoline driving to a plant during the working day and found employment offices closed—only open mornings; found employment office closed on certain days; kept standing two hours in the cold, outside a warm reception room which could just as well have been opened; kept waiting hours at a time; got a job in shipping room, found other employees had constructed sleeping "nests" among the cases, was threatened with a beating for working too steadily; snotty answers to civil inquiries; arbitrary, overbearing, peremptory treatment by \$18-a-week clerks; attempts by guards and clerks to "pick up" girls; "fresh" remarks, sometimes obscene; miles of meaningless forms to fill out.

This sort of thing probably goes down with factory workers, who are used to it. But it only repels and upsets the kind of young women I have in mind. They are used to decent and courteous methods of doing business and if they don't get them they will simply walk out.

The trouble seems to be that plant managers still think they are doing men and women a favor when they give them jobs.

DARIEN

## ABSENTEEISM

Sir:

Will you be kind enough to forward me a copy of your magazine containing the article on absenteeism which was reported under New York date-line Feb. 11, 1943, by the Associated Press?

J. HARRY LaBRUM,  
Major, Signal Corps  
Philadelphia, Pa.

Sir:

Is it possible for us to purchase six copies of reprints of the article on "Absenteeism" which appeared in your Feb. 11 issue?

E. M. CROMWELL,  
Librarian  
Armstrong Cork Co.,  
Lancaster, Pa.

• The article was not reprinted, but we have managed to get three clippings from office copies of THE IRON AGE, and are sending them to you. See page 95, Feb. 11 issue.—Ed.

## WELDING HISTORY

Sir:

To help your inquirer on the history of welding, we are sending you the following references:

History and developments in the art of welding ferrous metals, by A. J. Moses (Hedges Walsh, Weidner Co., Chattanooga, Tenn.), in *Combustion (periodical)*, Feb. 1932, p. 38-44; Mar. 1932, p. 26-30; April 1932, p. 28-33; May 1932, p. 7-14, illustrated 35 figs. Quarter Century of Welding, by T. B. Jefferson, in *Welding Engineer (periodical)*, May 1941, p. 21-24, 38, illustrated 6 figs.

L. A. EALES,  
Head, Technology Dept.  
Bridgeport Public Library,  
Bridgeport, Conn.

## HARD CHROME PLATING

We would like to obtain a copy of THE IRON AGE dated Nov. 19, 1941, or Dec. 19, 1941. It contains an article on hard chrome plating.

R. M. GOODSELL,  
Sec.-Treas.

Racine Plating Co.,  
Racine, Wis.

• No issue of THE IRON AGE was published on either date. Latest articles on hard chrome plating were in Feb. 4 issue, "Hard Chrome Plating for Wear Resistance and Salvage," and Dec. 10, 1942, "Tool Life Increased by Improved Chromium Plating Process."—Ed.

## TOOL AND ALLOY BAR PRICES

Sir:

We are interested in knowing potential sources of supply on steel products particularly alloy bars and tool steels of various analysis in the Los Angeles district. As near as we are able to determine from the chart on page 142 of your Feb. 4 issue, a base of \$2.70 on the Hot Rolled Alloy bars would apply with basing point being Bethlehem, Massillon or Canton, Ohio.

I. L. GIBBS,  
Pur. Agt.  
Mechanical Products, Inc.,  
618 N. Mechanic St.,  
Jackson, Mich.

• Tool steel prices are based on f.o.b. Pittsburgh, Bethlehem or Syracuse. See page 143 of this issue. If the material is obtained from warehouses, add 3c. lb. Your nearest basing point for alloy bars, hot rolled, is Chicago, with a base price of 2.70c. lb. To this price must be added certain alloy differentials. If the material is a National Emergency grade of steel, see the differentials on page 143 of this issue. Also add the freight rate to your locality plus the 3 per cent tax on freight rates. All this is quite complicated and has been known to unsettle the mind of many a purchasing agent.—Ed.

## SCREW MACHINE INSTRUCTIONS

Sir:

In your Feb. 4 issue, H. J. Henke inquires for literature on screw machine instruction.

The Cone Automatic Machine Co., Windsor, Vt., has new handbooks on the four-spindle Conomatic and also on the eight-spindle. A new handbook on the six-spindle Conomatic is just off the press.

CLIFFORD STUBBS,  
Vice-President

H. A. Loudon,  
603 Statler Office Bldg.,  
Boston, Mass.

## MARTEMPERING

Sir:

Please send us two copies of "Martempering," by B. F. Shepherd, as published in your Jan. 28 and Feb. 4 issues.

A. S. JAMESON,  
Works Metallurgist  
International Harvester Co.,  
West Pullman Works,  
1015 W. 120th St., Chicago

## CHARCOAL IRON

Sir:

I am interested in obtaining some information on the manufacture of charcoal iron in this country together with charcoal sources.

PROF. J. F. OESTERLE  
University of Wisconsin,  
College of Engineering,  
Madison, Wis.

• Charcoal iron is a manufacturing technique that has practically disappeared in the United States and is carried out only in the case of a few small furnaces with local charcoal facilities. Four furnaces currently making charcoal iron are at Newberry, Mich., Welles, Mich., Manacelona, Mich. and Lyle, Tenn.—Ed.

## BURN REMEDY

Sir:

I should like to know more about Hexene-ol, the quick healing burn treatment, referred to on page 69 of your Feb. 11 issue. Where can it be purchased?

C. J. BUSANOVICH  
RCA Mfg. Co.,  
Princeton, N. J.

• We understand that Hexene-ol is not yet in quantity production, but a working sample might be obtained from Dr. Benjamin Levine, Mt. Sinai Hospital, Cleveland.—Ed.

## CHROMIUM PLATED TOOLS

Sir:

Your Dec. 10 issue contains an article, "Tool Life Increased by Improved Chromium Plating Process." Can you put us in touch with the people who have this process?

B. M. BROWN,  
Genl. Supt. Motive Power  
Southern Pacific Co.,  
65 Market St.,  
San Francisco, Calif.

• Suggest you get in touch with Axel Lundbye, Chief Engineer, Crowell-Collier Publishing Co., Springfield, Ohio.—Ed.

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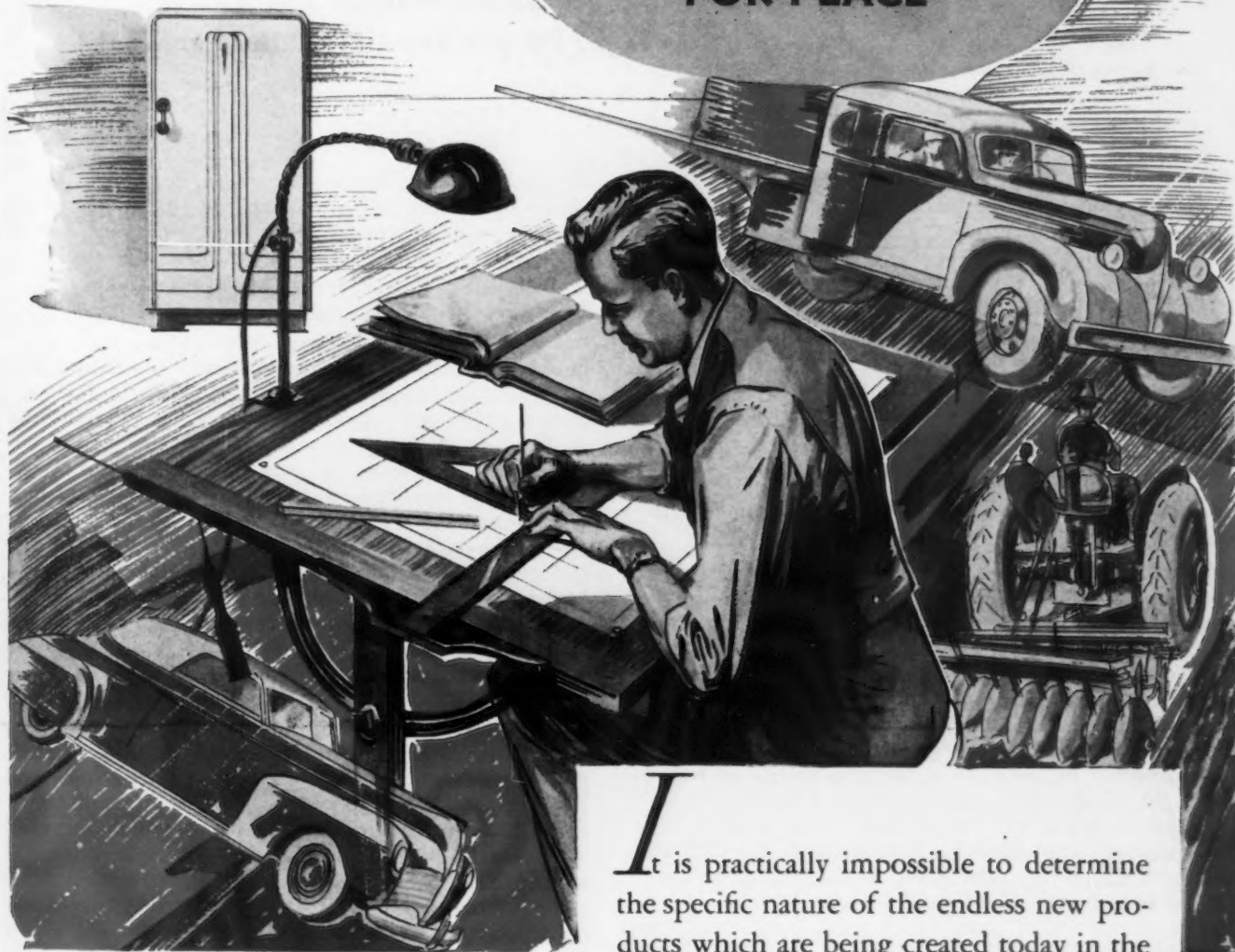
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# This Industrial Week . . .

- **Steel Orders Shoot Upward**
- **Coal Strike Would Be Serious**
- **Attack on Bottlenecks Aggressive**
- **Ingot Output Remains at 100 Per Cent**

**H**IGHLIGHTS of a typical war week (the current one) in the United States include:

A steep upsurge in steel orders; ingot production holding at 100 per cent; heated disagreements over certain phases of the new Controlled Materials Plan; the steel industry striving to overcome a temporary problem concerning the quality of steel plates; the WPB hard pressed to find steel for the oil industry, for repair parts of all kinds and for welding rods needed in maintaining farm equipment; manpower shortages threatening maximum machine tool production in some key areas; John L. Lewis rumbling about a possible work stoppage at soft coal mines—these are among the varied developments in the spotlight as the merry-go-round whirls on.

**STEEL ORDERS**—Mill schedules for April have been filling with directives and CMP orders at a rapid rate. Very large gains are reported at individual companies for the month to date compared with the corresponding February period when most plants were booking at a rate in excess of shipments. Meanwhile the confusion existing over CMP procedure is more tense as CMP order volume rises. Steel company priority experts are putting in plenty of overtime. At Washington, a meeting on CMP last week was practically a free for all fight, with most of the disagreement centering over whether Form CMP-6, the form which was scheduled to accompany orders, should be reinstated.

**STANDARDIZATION** of sizes of airplane tubing was the topic of an important discussion at Dayton, Ohio, last week, reflecting the necessity for easing somehow one of the numerous tight situations on aircraft materials. Meanwhile, testimony at Washington and opinions expressed by authorities elsewhere, indicated that several factors rather than any one cause resulted in the sinking of the tanker "Schenectady" (now seaworthy again) at a West

Coast outfitting dock. The steel industry aggressively is tackling the problem of sulphur segregations in steel plates, which some authorities believe is caused by the use of high sulphur fuels and large amounts of home scrap from shell steel.

**LEWIS ULTIMATUM**—The talk which has come out of New York recently in regard to a possible soft coal strike may be "window dressing" in part, but if the mine union decides that a strike is the only means of obtaining its demands, steel production will suffer. Especially at blast furnaces using beehive coke, the walkout would be reflected quickly. Will Lewis succeed in by-passing the War Labor Board, and if a strike comes will the government undertake to operate the mines? These are among the questions standing out at the moment. Most interested spectator probably is Phil Murray, head of the steel union, who has a few demands of his own in mind and who, in the opinion of some observers, does not want to see the WLB sabotaged.

**E**FFORTS of the steel industry to ease the critical shortage of electric furnace alloy steel are gaining headway a little. After months of experimenting, bullet core wire now is being made from cold drawn open hearth steel, a development which releases some electric furnace capacity for other purposes. In the important aircraft field, manufacturers are believed to be looking more kindly upon the use of open hearth alloy steels for certain purposes where formerly electric furnace steel was considered mandatory. It is interesting to note that output of all alloy steels in January, 1943, was 239 per cent above the average 1929 monthly output, and that currently alloy steel production accounts for about 17½ per cent of the total steel produced. With the drive for the production of more alloy steel in open hearth furnaces and with the substantial increase in electric steel capacity expected later this year, the per cent of alloy steel to total steel produced will be above the expectations of even the most optimistic observers. It is to be remembered, however, that making open hearth alloy steel displaces much more than a like amount of carbon steel.

**INTEGRATION**—Attempts to smooth out rough spots in the war steel picture by putting idle inventories to use and by re-allocating orders are being speeded over the nation. One steel mill in the Chicago area has had shell steel taken from it and re-allocated to mills in Youngstown and Pittsburgh. Another committee has been active in re-allocating sheets used for

## News Highlights in This Issue

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aircraft landing mats. While some of the recent integration moves have been in contradiction to efforts of other WPB departments to reduce cross hauling, the actions on the whole are believed to represent a valuable compromise. Incidentally, the Army's carbon steel requirements as submitted to the Requirements Committee of the WPB have been lopped off 8 per cent at least, but practically all agencies suffered reductions from the amounts they requested.

IF the oil industry is to be given a "fair show" for carrying on its work during 1942 by the utilization of various steel stocks throughout the country, prompt action must be taken by WPB on 1943 requirements of casing, tubing, and drill pipe. It is estimated that actual steel shipments to the oil and gas industry during 1942 were 27 per cent below the 1935 to 1939 yearly average, after having been approximately 35 per cent above that average in 1941.

Despite pleas of the Petroleum Administration for War and pressure by oil companies, the WPB consistently refused to loosen up steel supplies for oil well casing and tubing until late in 1942, when the nation's vast reservoir of casing and tubing had been reduced to a mere 260,000 tons.

**TANKS AND SHIPS**—Tank production continues to be reduced with several thousand tanks in the medium and light classifications standing by at parks in this country awaiting shipment abroad. Some plants today are working at definitely lower levels than they were a few months ago. . . . For the first time since it entered upon its war construction program, the Maritime Commission in its February report made no mention of a shortage of steel. . . . The reorganization of the War Production Board is completed and a directive putting the new plan in effect will be issued within a few days with an important part concerning the rebuilding of the Resources Agencies.

Iron Ore Wage Situation Summarized

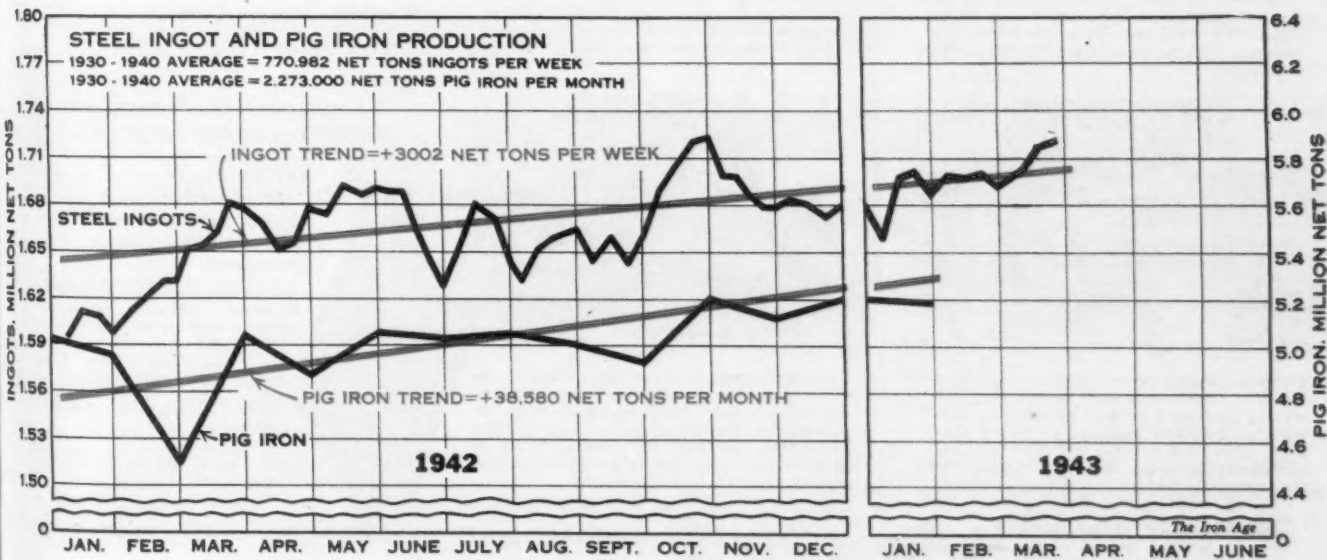
Pittsburgh

• • • The increase of five and one-half cents an hour to 1700 employes of the Oliver Iron Mining Co., U. S. Steel subsidiary has caused a ripple in union circles here as to whether this action breaks the "Little Steel" formula. The union claims that the formula was never intended to become a ceiling for wage increases and charges that in recent WLB decisions this has become the case.

In the case of Oliver, the increase was more than the 15 per cent advocated in the "Little Steel" formula but the board pointed out that the mining company had always given the same raises as the steel-making companies of U. S. Steel Corp.

It is believed that this week decisions will be handed down on 14 other mining companies whose cases have been heard by the Panel Board. Observers here see the same directive on them as was ordered for the Oliver company.

THE national rate of steel ingot production this week continues at 100 per cent of capacity. Operations in the Pittsburgh district have gained half a point to 102 per cent and at Detroit, output is up two and a half points to 104.5 per cent from last week's revised rate of 102 per cent. Steelmaking in St. Louis has increased by three points to 104.5 per cent and in the Eastern district the rate has jumped five and a half points to 95.5 per cent. The sharp decline of two and a half points to 98.5 per cent in the Chicago ingot rate this week is due almost entirely to the revised capacity figures since this tonnage production is just slightly below that of a week ago. Buffalo is down two points to 104.5 per cent and operations in the Cincinnati district have declined one point to 99 per cent. The Youngstown area at 102 per cent, Cleveland at 99 per cent and Birmingham at 102 per cent, are all unchanged.



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	S.Ohio River	St. Louis	East	Aggregate
March 11	101.5	101.0	102.0	93.0	99.0*	106.5	88.0	102.0	102.0*	102.0	100.0	101.5	90.0	100.0
March 18	102.0	98.5	102.0	93.0	99.0	104.5	88.0	102.0	104.5	102.0	99.0	104.5	95.5	100.0

\* Revised



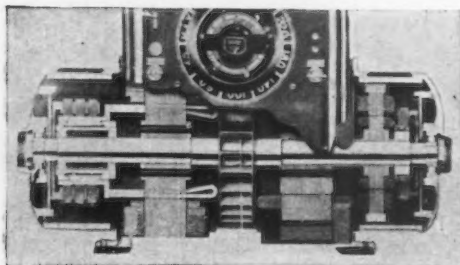


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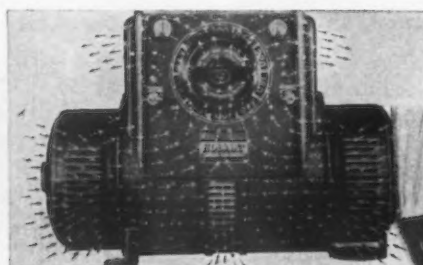
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## Crack-up of Tanker Attributed to Weather, Steel Quality, Welding, Other Factors . . .

... On Jan. 16 the tanker Schenectady returned from an acceptance run and tied up to the dock of the Swan Island Kaiser yard in Washington, and was being loaded with supplies when it split open and sank. Immediately, a multitude of reasons were advanced for the failure, including poor welds, locked-up shrinkage stresses, silt collecting under the middle of the boat (it opened up transversely, but the keel plates did not part), earthquake, a strong side wind, improper loading or ballasting, and finally cold air temperatures contrasted with relatively warm river water.

Divers scotched the theory that the ship settled on a sand bar when the tide went out; the seismographs recorded no earthquakes the fatal day of Jan. 16; the night was not too cold (air temperature 33 to 23 deg. F.; water temperature 40-45 deg. according to the Weather Bureau), and if the ballasting had been bad, the ship would have broken in a seaway during the trial run and not at the dock. Since the early reports, numerous men have investigated the matter, and it is believed that the American Bureau of Shipping, at the request of the Maritime Commission, will this week issue an official report on causes and preventions, despite rumors that the matter was to be quietly shelved.

It is possible that the American Bureau of Shipping will list a number

of contributory causes, with the finger pointed particularly at the sequence of welding and at submerged melt type of automatic welding for certain joints, despite the fact that many other tankers have been built largely by this method. Already this Bureau has ruled out the submerged type of welding for joining the deck structure to the side plates, where it is necessary to lay in a very heavy bead of

### Authorities Shed Light on Problem Needing Discussion

metal. Elsewhere in the ship submerged welds are considered very satisfactory and certainly the practice is very popular with shipbuilders. Practically all the investigators give major importance to proper sequence of welding, irrespective of type of weld, and the avoidance of serious locked-up stresses, and certain secondary factors have been brought into various discussions, varying from steel quality, skill of workers, wind, wave, temperature, ad infinim.

#### Kaiser's Testimony

Henry J. Kaiser himself last week told the Truman Senate Committee

Investigating National Defense that defective steel was the No. 1 but not the only cause for the cracking-up. At the same time he said that a similar ship, with the same sequence of welding, the same stresses, "and everything else as far as we know" stood a rigid test made after the Schenectady broke up.

Mr. Kaiser said that there are "some 40 people from all over the United States making investigations on it," indicated that the inquiry is broader in scope than was generally known. He claimed that his statement regarding defective steel was based on reports he had seen "by competent authorities, signed by competent authorities" and that they "show that the steel is very far below specification yield. The yields are very low, under the specification."

"Where it broke?" inquired Senator Brewster, Republican of Maine.

"Where it broke," replied Mr. Kaiser, who said "the piece came from Carnegie Steel Corp. The steel is declared as dirty, and the letter states that unquestionably it is a very great factor in the breaking up of a ship."

Mr. Kaiser did not explain what "letter" he had in mind or by whom it was written, but he did say that this "test that I am giving you on the steel was made by the University in their laboratories. It was extensively tested."

Mr. Kaiser conceded that it isn't right to say that any one factor caused the ship to break, but that he did not believe that the speed of welding is a contributing factor.

"I do believe that you can get locked-up stresses through sequence of welding, but there is no means of knowing exactly how you do that," said Mr. Kaiser. "As nearly as possible, everyone is following a sequence of welding that is prescribed for them."

He made the suggestion, in saying



that steel is not the only problem, that unusual weather conditions prevailing at the time of its breaking may have been one of the causes for its breaking.

"The river raised and lowered one foot at the same moment that it cracked," Mr. Kaiser said. "Another factor is that the water was warm and it was the coldest day in the history of Oregon, and they had an expansion condition there that probably you wouldn't get at the same time.

"It was out of our hands completely. It was not in our hands. We had delivered the ship, and it was accepted by all the agencies. That is important. It was accepted by all of the agencies and it was out of our hands."

When Senator Brewster said that he assumed steps were being taken to prevent a recurrence of the crack-up, Mr. Kaiser replied that that was not his province and that he doesn't inspect or furnish the steel. That, he said, is done by the Maritime Commission.

The Schenectady, Mr. Kaiser declared, is not the only ship that "they are having problems with."

Describing the crack-up of the Schenectady, Mr. Kaiser said that it was being loaded at the time with provisions.

"The forward tanks were loaded, the rear tanks were loaded, and the center tanks were not loaded," Mr. Kaiser explained. "At the same time, there was a tremendous breeze. So every strain that you could possibly imagine was at that particular moment. It was a very unusual condition."

"You do not feel that the speed of construction was in any way a factor?" asked Senator Brewster.

"The best evidence of that is that they haven't reduced our speed of construction," Mr. Kaiser replied. "We are building them faster."

Hugh A. Fulton, chief counsel for the Committee, inquired whether if too big a subassembly is welded to another, the section is less free.

"I was with 40 men for almost an all-night session with just this same kind of argument," said Mr. Kaiser, "and there were almost as many opinions as there were men as to what would happen. The general opinion is that the more sections you have, the less locked-up stress you get."

He pointed out that if a whole ship were welded complete with resultant stresses, the stress would "carry on,

• • • It is understood impartial authorities are investigating the steel plate problems which are mentioned in this article, and when their findings are announced they will be summarized in THE IRON AGE.

The tanker Schenectady, mentioned in this article, is once again seaworthy.

carry on, carry on right through to the end of the ship." But when the welding is done in sections, he added, the stress is ended when the section is complete. Joining the sections, he said in reply to a question by Mr. Fulton, doesn't create the stress. The problem, it was stated, is in the individual weld as it proceeds along a piece.

"In any event, from your investigations you are sure that your ships, as built, are capable of operation as well as the others?"

"Frankly, I believe it is a problem," said Mr. Kaiser, "but not one that publicly is a dangerous one."

#### Poor Steel Quality?

Although Mr. Kaiser attributes the failure to defective steel, certain of the investigators consider this only a growing but still only an annoying problem. Shipbuilders on the West Coast complain constantly to editors of THE IRON AGE of "laminated" plate. The chief fault found with recent deliveries—no particular supplier has been singled out—was sulphur segregations. These streaks of high sulphur laminations (up to 0.20 S)

in plate ends do not show up until the plates are arc welded. Then the butt ends literally blow up if there are high sulphur segregations present. While the percentage of plates having such laminations is small, the problem is one that is a serious source of concern to both shipbuilders and steel mills.

In some cases, the bad weld, full of blowholes, can be chipped out with an air chisel. On the second pass the weld is perfectly sound as all the sulphur has literally been boiled out in the first fusion of the base plate. Where the laminations extend far into the plate, however, sections as long as 18 in. have been cut out and a new piece welded in. Since the butt welds are usually made before the longitudinal seams are started, the possibility of serious locked up stresses is largely avoided.

Steel men have several answers to this condition which they admit exists. In the first place, ingots poured for ship plate, which is a low carbon steel, are seldom if ever made in an inverted mold with a hot top. There are not enough of such molds available.

As to the sources of sulphur contamination, there are two main ones: use of inferior grade fuels, both oil and coal, which are higher in sulphur than would be acceptable under ordinary market conditions, and use of high sulphur bearing scrap. Sulphur in fuel gases is readily taken up by the metal in the open hearth.

The chief source of scrap high in sulphur is shell steel which is somewhat similar to a screw machine stock and is made high in sulphur to increase its machinability. One source of such scrap is turnings, which the mills are now being forced to use in increasing quantities in their open-hearth charges. By far the larger source, however, is home scrap—billiet crops and bar ends of shell steel.

Of course it would be possible to

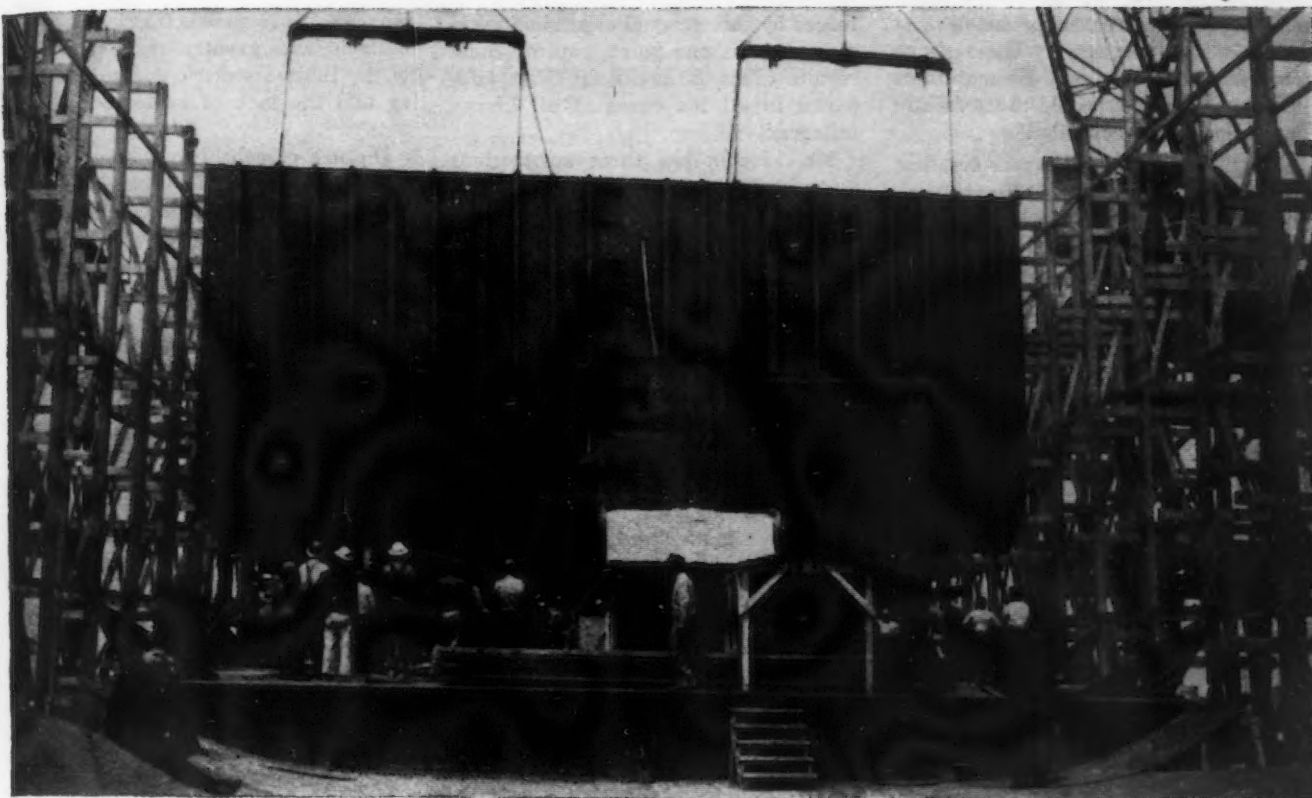
• • • Chicago district foundrymen, especially steel foundrymen, also report growing concern over the increase in sulphur content of the metal they are producing. This increase, notable over the past two months, is attributed largely to the higher percentages of oily scrap which they must use, particularly in the form of turnings.

Some plants are running sulphur analyses of each car of turnings before using it, but assert that these analyses are often deceptive and do not indicate the true sulphur value. It was stressed that to make such tests of value, it is neces-

sary to obtain truly typical samples, including samples from the bottom layer of the car.

Many foundrymen who would be in a position under normal conditions to discard scrap with excessive sulphur are often unable to do so as they badly need the alloy content of the turnings.

While intensified desulphurizing of the molten metal does serve to keep the final S content down, the uncertainty as to the amount of S entering in a charge makes it difficult to keep the final S within reasonable limits.



**DROPPING A BULKHEAD SECTION onto a double bottom at a Kaiser yard. These sections are welded into sub-assemblies and then brought to the way.**

remove much of this sulphur in the open hearth, as a considerable portion is, but this takes precious time and time is definitely a function of mill capacity. Completely eliminating the sulphur might mean the difference between getting two heats as against one and a half heats every 24 hr., or a reduction of 25 per cent in ingot producing capacity—assuming, of course, that in the additional refining time more sulphur might not be taken up from the fuel. It's a metallurgists' dilemma, besides being a good argument for the proponents of defeating the axis from the air. Bomb steel does not have to be free-machining!

#### **Welding Arguments**

Proponents of welding have been quick to point out that it was the plates that fractured transversely and not a vertical butt welds on the side plates nor horizontal butt welds on the deck plates. In opening up, of course, fracture obviously did take place across the longitudinal seam welds.

While some suspicion is directed to the steel plates themselves, certain limitations in the application of submerged melt automatic welding were put into effect by the American Bureau of Shipping a few days following this notable failure, indicating

that shrinkage stresses were involved. These new regulations apply to all types of non-naval vessels and apply specifically to welding the deck plates to the shear or side plates in such a manner, and also the fillet welding of hatches to decks. Improper plate edge preparation and improper specification of the type of welded joint—in other words, questions of design—enter here and tend to complicate the problem and its solution. While hand arc welding will replace automatic welding for the present on such fillet welds, the measure is probably no more than a stop gap, until the full facts are known.

Much point has been made of the fact that the final welds joining the prefabricated deck sections to the shear strokes were made by the automatic process whereas in many similar ships that have performed satisfactorily, the welds were made manually. On the other hand, the largest producer of tankers in the country was the first to use automatic welding on a large scale. This yard, which has had no failures, has used automatic welding for many years, not

only for butt and longitudinal welds of the deck plates subassemblies, but also for making the fillet welds in attaching the structural stiffeners to the underside of the deck plates. In the Schenectady, these stiffener fillet welds were made by hand.

From reliable sources, it is learned that the tear in the upper side plate (shear strake) began at a badly undercut, porous hand arc weld at the point where the curved "fashion" plate joined the shear strake. It could have acted as a severe stress raiser. The break cut directly across a longitudinal automatic weld joining the deck plate to the shear strake. This weld was a poor one. It did not completely fill the prepared V and two poor manual welds had been laid over it to finish it. There was a longitudinal shrink crack in the automatic weld nugget, but this crack did not contribute to the failure which took place across the weld.

One theory advanced is that the failure did not start at this shear plate but was primarily due to locked up stresses in the deck plates. These deck plates sheared transversely and not within 5 ft. of the nearest butt weld, which was made by the automatic process. Another theory, advanced by James F. Lincoln, president of the Lincoln Electric Co., is that locked-up stresses did not cause



the break, the reasoning being that such stresses decrease continuously as soon as the weld is cold. He maintains that such stresses would cause failure immediately or not at all.

This same authority reasons that "it is possible to have unequal expansion of the shell of the ship compared to its deck. Since the temperature of water is fairly constant compared to the air when the ship is in cold air, the shell is expanded compared to the deck thus putting a tensile stress on the deck which may be very great. For instance, a difference of 15 deg. F between the shell and the deck will make a relative change of  $\frac{1}{4}$  in. in the length of the deck and the shell of the ship. Normally the deck would stretch by this amount without further damage. If there is an incipient tear started at the longitudinal center of the deck, however, then all the stretch will take place at this point. If there is an abrupt change of section of the deck the same tendency will result. If the stretch

forced by this unequal expansion takes place in this one point, rupture must result. This is obviously what happened in all the cases of all known failures."

Mr. Lincoln has three suggestions as to how such tensile stresses in the deck plates could be eliminated. One would be to make the deck stronger relatively than the shell so the deck will bend the shell instead of the shell stretching the deck. The second would be to put a wrinkle in the deck which the tensile stresses would tend to straighten out. Third would be to put the deck under compression at the time of construction by wedging the deck plates apart at the center section. Compression produced would tend to offset any tensile stresses set up by differences in temperature referred to above.

Even after the official report of the investigating committee is published, it is more than likely that the argument will go on for some time between the various commercial interests involved.

capacity for production by these methods was greatly restricted both by the limited electric furnace capacity and the lack of centerless grinders.

The use of cold drawn open hearth steel bars for bullet cores permits the extended production now no longer possible from the nation's electric furnaces which are strained to meet existing needs. At the same time, the substitution of cold drawn bars has eliminated the necessity for centerless grinding, thus both releasing existing capacity for other purposes and placing no further load on manufacturing.

Close control in steel melting, refining, pouring, heat treating, and handling is the prime requisite for production of bullet core steel.

The rods are heat treated and cold drawn in such a way that the product is of high machinability. While the process has necessitated the introduction of many revolutionary practices in steel making, there was a minimum of new equipment required. The net gain in increased output of bullet core wire from cold drawn open hearth steel bars, with its accompanying release of other materials and facilities, has been of considerable value in the production of other armament.

## Open Hearth Application Releases Electric Furnaces

### Cleveland

• • • Bullet core wire made from cold drawn open hearth steel is one of the major contributions of the war effort and is the result of metallurgical and inventive genius of the American Steel & Wire Co., Cleveland. The use of open hearth steel for this purpose releases substantial quantities of electric furnace steel and electric

furnace facilities for other purposes, thus effecting a two-fold contribution to the war effort.

This especially developed cold drawn bar from open hearth steel has proved highly satisfactory for use in the core, or "stinger" of machine gun ammunition. While theretofore specifications called for electric furnace steel and centerless ground bars,

## WPB Reorganizing Farm Machinery Branch

• • • A reorganization of WPB's Farm Machinery and Equipment Division was announced last week by George Krieger, acting director.

The new setup will have the advice and assistance of four new special consultants; Daniel C. Heithu, Albert W. Lavers, Elmer McCormick and David A. Milligan. The reorganization also places the following men in important administrative positions: W. Burr Downs, assistant director; William F. Heesch, assistant director in charge of production, and Mark K. Butts, as chief of distribution branch.

## Tank Suspension Units Produced by Hudson Motors

### Detroit

• • • Hudson Motor Car Co. has been producing suspension units for M-5 tanks for several months, A. E. Barit, president, has announced. Fabrication of required parts called for more than 500 special tools, jigs and fixtures, as well as conversion of more than 200 machines, he stated.

### Steelmaking and Blast Furnace Capacity by Districts— as of Jan. 1, 1943

Due to typographical errors, several of the district capacities in the table on page 93 of the March 11 issue of THE IRON AGE were incorrect. The table below gives the corrected capacities.

District	STEEL (in net tons)				PIG IRON (in net tons)		
	Open Hearth 87.0%	Bessemer 7.3%	Electric and Crucible 5.0%	Total 100%	Pig Iron	Ferro- Alloys	Total
Pittsburgh.....	17,662,350	2,150,000	731,960	20,544,310	14,577,400	397,900	14,975,300
Chicago.....	16,452,600	830,000	732,100	18,014,700	12,654,510		12,654,510
Youngstown.....	9,444,470	1,724,000	1,620,680	12,789,150	7,539,240		7,539,240
Philadelphia.....	10,321,040	240,000	424,430	10,985,470	6,071,690	206,980	6,278,670
Cleveland.....	3,940,000	584,000	6,900	4,540,900	4,908,100		4,908,100
Buffalo.....	4,362,950		79,600	4,442,550	4,440,000		4,440,000
Wheeling.....	2,998,120	1,015,000		4,014,120	2,902,320		2,902,320
Southern.....	3,577,000		107,600	3,684,600	4,176,940	188,120	4,365,060
Detroit.....	2,792,800		366,990	3,159,790	1,604,000		1,604,000
Western.....	2,612,530		208,020	2,820,550	1,566,100		1,566,100
S. Ohio River.....	2,743,180		40,000	2,783,180	1,754,800		1,754,800
St. Louis.....	1,668,770			1,668,770	427,030		427,030
Eastern.....	614,270		240,800	854,770	411,400		411,400
<b>TOTAL.....</b>	<b>79,180,880</b>	<b>6,553,000</b>	<b>4,558,780</b>	<b>90,292,660</b>	<b>63,033,330</b>	<b>793,000</b>	<b>63,826,330</b>

## Tool Reclamation Saves Huge Total of Hours on War Production Job

### Chicago

• • • International Harvester Co. was able to save 4,368,000 man hours on a recent war production job through utilization of its tool reclamation and salvage program, W. A. Johnson, research engineer of the company's tractor works, told THE IRON AGE in an interview following an address by Mr. Johnson which featured the War Production Clinic held here last week.

Mr. Johnson explained that the company was unable to obtain on time new boring mills required for a war contract and by rebuilding old and discarded tools the company was able to get into production with 1400 men some 18 months earlier than would have been possible if the company had waited for delivery of new tools. In Mr. Johnson's formal address he told the 1800 engineers who attended the clinic that 14 per cent of Harvester's expenditures for cutting tools in the past year had been supplied by the company's reclaiming and rebuilding department.

The production clinic was sponsored by 23 technical associations and government agencies, including the Army and Navy. Panel discussions were held which covered foundry problems, machine shop practice, welding, metallurgy, inspection, testing, plastics, protective coatings, manufacturing personnel and communications equipment.

The panels were run on an informal style and this reporter, who attended many of the meetings, can confirm that many perplexing production problems were solved there by the interchange of information.

Col. James L. Walsh, chairman of the war production committee of the ASME and a director of the Army Ordnance Association, who spoke at a dinner which closed the clinic, called upon the engineers to devise new short cuts in arms production as a means of shortening the war and saving lives.

In Mr. Johnson's address on Harvester's tool salvaging, rebuilding and redesigning program, he pointed out that the success of such an endeavor depends upon the cooperation of all the company's organization, not just one man or one department.

The scarcity of materials and machines needed to produce tools makes

it imperative that 100 per cent use of each tool be realized, he said. If proper care is given a tool, this can be accomplished, he added.

To get a tool reclaiming program moving, it is necessary to have a stock of broken or discarded tools on hand, Johnson explained. This should be accompanied by an educational program to correct tool abuses and misuses. Harvester found that an effective way of doing this was to

### Attachment for Drill Reduces Size of Chips

#### Chicago

• • • An innovation in drilling metals and plastics was exhibited publicly for the first time by the Bastian-Blessing Co. at the War Production Clinic here last week. This development was in the form of an attachment which causes the drill to reciprocate axially a very small amount on each revolution.

This motion is said to result in smaller chip size, lack of splashing of coolant, higher cutting speeds and hole alignment, wall finish and hole size of good to better than that realized under similar conditions with conventional drilling practice. It was reported that in some instances holes can be drilled to size without the need for reaming. The device is called the Rego Karweit drill.

show broken tools, giving cost of the tool and the amount of money and production lost through the breaking of the tool.

Johnson recommended that all requisitions for new tools pass through the salvage department before going to the purchasing department to give the former a chance to determine if the order could be filled with reclaimed tools.

Centralized grinding of tools was stressed as a good way to lengthen tool life and prevent many abuses. The number of unskilled workers employed by industry today makes it undesirable to permit them to sharpen their own tools.

Mr. Johnson discussed four methods of reclaiming tools. One was to anneal, refabricate the tool and harden.

This, however, was not an entirely satisfactory method due to the equipment needed, the lack of complete analysis of the tool for establishing drawing temperatures, etc.

Another method is that of regrinding in the hard. By this method it is possible, for example, to make reamers from undersized tools or end mills from old taps, etc.

Another procedure is to build up by welding. Johnson remarked that this practice has considerable promise and is being given further study by Harvester. Another procedure is to utilize low temperature brazing. This is being extensively done by Harvester.

The steps taken to reclaim a tool by low temperature brazing were listed as: (1) Grinding the surfaces and otherwise preparing them for brazing. If the break is clean, don't grind; (2) prepare the joint by removing dirt, cutting oil, etc. This is very important. Harvester finds that the use of carbontetrachloride and a brush is an effective method; (3) preheat tool and coat ends of break with flux; (4) preheat the tool, a very important step; (5) apply brazing material; (6) remove excess brazing metal, and (7) grind and resharpen.

The preheating is necessary, Johnson explained, to prevent cracking. This preheating can be accomplished with the torch or in a small furnace. The rods are usually alloy rods which melt between 800 and 1600 deg. F. The low temperature rod melts between 1175 and 1300 deg. F.

Repairing most tools by this method usually requires alignment. This can be done by use of universal fixtures to support the tool. Tools reclaimed by this method, according to Johnson, have a life fully equal to a new tool.

Johnson indicated considerable interest in chrome plating of tools as a means of protecting them, but said that wide use of this idea is being held up by the fact that the chrome has a tendency to peel in operation.

### WPB Stops Construction Projects Worth \$18 Million

#### Washington

• • • Continuing its policy of curtailing construction not directly related to the war effort, WPB, on March 10, announced that projects having a total cost of \$18,656,613 were stopped during the week ended March 5. The figure brings to \$1,325,009,008 the total cost of all projects which have been halted since Oct. 23, 1942.



## Farm Shortage Aggravated by Inability to Get Welding Rods

### Cleveland

• • • With the nation facing a possible acute shortage of agricultural products during the coming year and with the planting season drawing near, farm repair shops are experiencing extreme difficulty obtaining welding rods and electrodes necessary to get farm machinery, equipment, and implements back into shape for use. This inability to obtain welding rods and electrodes is the result of the cancellation of WPB Regulation L-147 some time ago.

Under the existing regulations, the farm equipment repairmen are required to file with producers of welding rods and electrodes an order on which the best rating obtainable is AA-1 when issued by the regional WPB offices in extreme urgency cases or the usual AA-2-x rating, issued by the district WPB offices. Of course, the repairman can solicit regular rod distributors for his needs, but this is practically useless since distributor stocks generally have been nonexistent for some time.

These rated orders for rods placed by the repairman with the producer are booked for filling by the producer in the sequence they are received under the rating they bear. However willing the producer may be to supply the small quantities usually required, he must of needs conform to WPB rulings and fill the order in its turn.

With the demand for rod by armament producers so extremely heavy, even orders rated AA-1 cannot be filled by most of the rod producers in less than six weeks and often not within 10 weeks. During this time, of course, repair of farm equipment is delayed. Furthermore, since inventories of rod are not permitted the repairman under WPB orders, difficulties in keeping agricultural equipment in service are pyramiding as the spring season approaches.

Several suggestions have been presented to remedy this condition, two of which bear especial merit. The first is to give such orders for repair and maintenance of farm equipment preferred status in the schedule of the producer, the same as was the case under the former L-147 limitation order. This would serve as a "go ahead" signal to the rod manufacturer to give the order preference over any or all other orders on the books and ship the material as quickly as possible.

The immediate objection raised to this formula might be that if it were done, emergency repair ratings would flood into producers, shoving other orders back on the schedule and seriously impairing production of rods for vital and necessary war orders. In a recent investigation, it was found by one large producer that such orders would not make up more than 3 per

cent of the total tonnage booked and would be more likely to total about 1 per cent. Under the original order, L-147, with its provision for repair and maintenance, emergency orders were considerably less than the 6 per cent of total tonnage produced, which was the quota for this use.

The other suggestion to alleviate hardship cases on farm repair and maintenance was to set up a WPB welding rod pool. As the Chicago WPB regional office serves a large proportion of the midwest farming area, this would be the logical place to establish such a pool. Each rod manufacturer in the country, of which there are some 30 odd, would contribute to the pool from one to five carloads of welding rods, depending upon the capacity of the manufacturer's plants. This would provide at least 50 cars and more likely close to 100 cars of rod, which would go a long way in ironing out farm emergencies.

This pool would be held by WPB to fill only orders from farm areas that were for repair and maintenance of agricultural equipment, implements, and machinery. Thus, full control would be exercised by WPB; assurance would be had that the rod would be used only for farm equipment repairs; and rod manufacturers would not have to tamper at all with production schedules.

As the rods required by the agricultural consumer are almost invariably plain or lime-coated, such a pool could be quickly set up. There would be no difficulties involved in obtaining critical rod coating materials and rod coating machinery that is now operating at capacity on rods for armament manufacturers would not be tied up.

The essential factor in any decision of WPB to remedy this condition, however, is speed. The plowing season in a large part of the country is already at hand, and it is extremely urgent from the farmers' point of view that immediate action be taken so that equipment can be put into shape for use. There remains only about two or three weeks at the most before the beginning of plowing, followed quickly by planting, cultivating, and other care that requires a great deal of mechanical equipment. This equipment must be repaired in many instances before it can be used. Unless these repairs are made and made quickly, there is every reason to expect that the manpower shortage on farms will not be the only factor in the curtailment of this year's farm output.

**NAVY CHART MAKING:** Navy Hydrographic Offices turn out more than 2-million charts of seas and harbors every month for the guidance of our fleets and friendly mariners. Here the complete charts are being engraved on a permanent copper plate before going to the printer.

*Harris & Ewing*



## Steel for Oil Industry Newest Task Facing War Production Board

### Pittsburgh

••• After doing an excellent job during 1942 on steel supplies to the oil industry, the WPB now is facing the responsibility of seeing that the nation's oil production is not impaired in 1943.

Despite pleas of the Petroleum Administration for War and pressure by oil companies, the WPB consistently refused to loosen up steel supplies for oil well casing and tubing until December, 1942. On May 1, 1942, it was estimated that approximately 1,300,000 tons of oil well casing and tubing were on hand as inventory in the U. S. The WPB could check closely on the oil industry because of the standardization in pipe sizes and physical requirements. By Dec. 31, 1942, this vast reservoir of casing and tubing had been reduced to a mere 260,000 tons and this residual probably constituted "cats and dogs."

There have been signs recently that the oil industry in 1943 would be furnished materials including pipe and casing so that drillings would not fall to a point which would jeopardize the supply of crude. According to oil authorities, however, materials for drilling constitute only a part of the picture. The more important part is said to be tied up in the dangerous reduction in wildcatting and the alleged uneconomic pricing of crude oil, which is said to have been more responsible than any other factor in cutting down the number of wildcat wells.

The PAW already has recommended that WPB furnish the material necessary this year to drill at least 4500 wildcat wells, in the hope that new fields will be discovered and that crude production will be stepped up. There are many in the oil trade who believe that none of this can be accomplished unless some change upward is made in the price of crude oil.

The current picture in the oil industry, while not unduly alarming, nevertheless appears to be on the verge of requiring immediate action. If the WPB shows the same intelligence in handling the requirements for additional 1943 materials as it did in forcing the use of inventories during 1942, the problem probably will not reach serious proportions, at least as far as the availability of supplies is concerned.

Using the years 1935 to 1939 for a base yearly average, total wells completed in 1942 were down 75 per cent. Crude oil production, on the other hand, in 1942 was 20 per cent above the 1935 to 1939 yearly average. Consumption of all oil was up 19 per cent in 1942 from the base average, while stocks of all oil (crude and refined) on hand at the end of 1942 were down approximately 10 per cent from the end of 1941.

It is estimated that actual steel shipments to the oil and gas industry during 1942 were 27 per cent below the 1935 to 1939 yearly average, after having been approximately 35 per cent above that average in 1941. The substantial decline in shipments of steel to the oil and gas industry from 1941 to 1942 was, of course, partially made up by the use of inventories on hand. From March, 1942, until December, 1942, very little oil well casing and tubing was made by steel companies, although a considerable tonnage was shipped during that period from mill depots.

With oil companies' stocks of casing and tubing practically at the van-

ishing point and with mill depots depleted of supplies, it is obvious that the WPB must loosen its grip rapidly on the distribution of casing and tubing to the oil companies if the forecast of approximately 1600 to 20,000 completed wells for 1943 is to come true. Danger signals were apparent as early as last October, and in December the WPB had begun to show a more liberal attitude toward casing and tubing.

While some sources believe that the 75,000 tons of pipe, including casing, tubing and drill pipe, originally slated for Russia and now for sale by the Metals Reserve Corp., might help the oil industry in its drilling program, there are several drawbacks to this optimistic opinion. Most of this pipe constitutes what the trade knows as "bastard" lengths and sizes. Practically all of it is what is known as J-55 which is priced at \$7.50 a ton more than H-40 (40,000 lbs. per sq. in. yield point), the type of steel usually ordered by the oil companies. The oil well tubing involved in this material is what is called Range No. 1, averaging 20 ft. in length. The oil industry usually uses Range No. 3 tubing which averages 36 ft. in length. If the Russian tubing was used, it would mean an average of almost 50 per cent in handling the pipe sections. It is believed that the oil well casing

**SUNRAY STOPS ABSENTEEISM:** Remarkable results have been obtained by the use of sunray apparatus by the workers at a British Ministry of Supply Factory engaged in vital war work. The staff, male and female, undergo treatment for set periods at intervals in their shifts, and it has been found that since its introduction absenteeism has decreased to the barest minimum.





could be used, except that the higher price constitutes a serious drawback as well as the sizes.

This material is to be sold at ceiling prices f.o.b. Pittsburgh, and Lorain, Ohio, with the MRC making the necessary freight absorption. It is believed that the pipe is not in A-1 shape as it has been standing for more than nine months in warehouse space. All of this leads to the conclusion that the WPB and the oil industry cannot depend too much upon the

possible benefits of the Russian pipe which is now on sale in this country.

If the oil industry is to be given a "fair show" for carrying on its work during 1942 by the utilization of various steel stocks throughout the country, there can be no room for dilly-dallying over 1943 requirements of casing, tubing, and drill pipe. With CMP pushing priority rated tonnage further behind on delivery schedules, it will take rapid and close cooperation between the oil industry, the

## U. S. Steel Breaks February Records

• • • Topping all February shipments of finished steel products in the corporation's history, subsidiary companies of the United States Steel Corp. reported 1,691,592 net tons shipped for the month of February, 1943. Further, combined January and February shipments were the highest first two months ever recorded by the corporation.

February shipments increased 5599 net tons over 1,685,993 net tons of the previous month (January), as well as 75,005 net tons over the 1,616,587 net tons in February, 1942. For the year 1943 to date shipments were 3,377,585 net tons, compared with 3,355,480 net tons in the comparable 1942 period, an increase of 22,105 net tons.

# PLANATHREADING

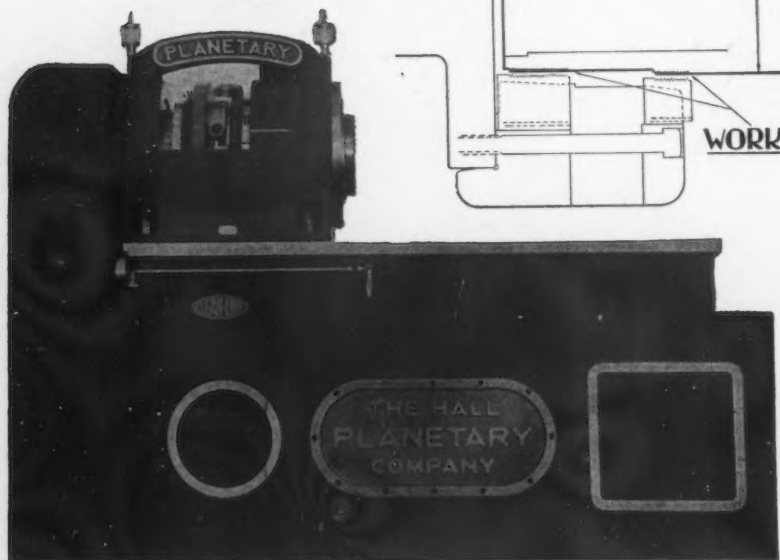
## 2 THREADS MILLED AT COST OF ONE

*A Real Saving*

**THIS JOB IN 5 MINUTES**

Perfect alignment and location of threads.

**LET US SOLVE YOUR THREADING OR MILLING PROBLEMS**



# HALL PLANETARY CO.

FOX & ABBOTSFORD AVE., PHILADELPHIA, PA.

PAW and the WPB, to see that no time is lost in fulfilling the necessary CMP requirements. If this is not done, the 1600 to 20,000 wells, including 4500 wildcatters, cannot be completed this year and a consequent drop in crude production with an estimated increase in consumption might bring about a serious national situation. Agreeing to furnish material to an industry is one thing, but the actual delivery of material is another.

## Plant Builder Outlines Post-War Research Points

• • • Harold K. Ferguson, president of H. K. Ferguson Co., industrial engineers and builders, has announced that his organization is attempting to answer, through industrial research, the following four points concerning the post-war construction period:

What customers want; what new types of industrial buildings and equipment are likely to be developed; what can be done to keep industrial construction work at reasonable levels to avoid depression experiences; what can be done to improve already harmonious labor relations.

Mr. Ferguson said that research in his organization is not participated in only by engineers and draftsmen, but extended into the ranks of the men who did the actual building—to the carpenters, ironworkers and bricklayers who are devising new, more effective and more economical construction techniques, and passing them on for the use of the entire organization.

# ARISTOLOY COLD DRAWN STEELS

*for speed  
in precision  
war production*



Cold Drawn Steels have the vital wartime job of keeping fast automatic production machines operating continuously at peak loads. The uniform surface and close tolerance of Aristoloy Cold Drawn Steels assure smooth machining with longer tool life and uninterrupted production.

**COPPERWELD STEEL COMPANY  
WARREN, OHIO**

**ARISTOLOY  
STEELS**

TO BUILD MORE... BETTER... FASTER



Carbon Tool Steels • Aircraft Quality Steels • Nitralloy Steels • Alloy Tool Steels • Stainless Steels • Bearing Quality Steels • Cold Drawn Steels



## CIO Threatens 15% Wage Formula

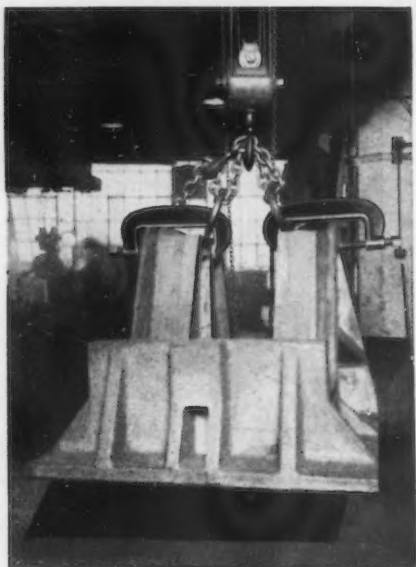
### New York

• • • CIO stage dressing for a staunch fight to break the "Little Steel" wage formula is seen in the cry raised by Philip Murray, CIO president against the 5½c. an hour pay increase granted to Oliver Iron Mining Co. employees last week by WLB. The union charges that the Board has abandoned its pet formula in the decision, granted

this U. S. Steel subsidiary, based on the fact that the union flatly stated that wages had already reached the 15 per cent limit when the increase was requested.

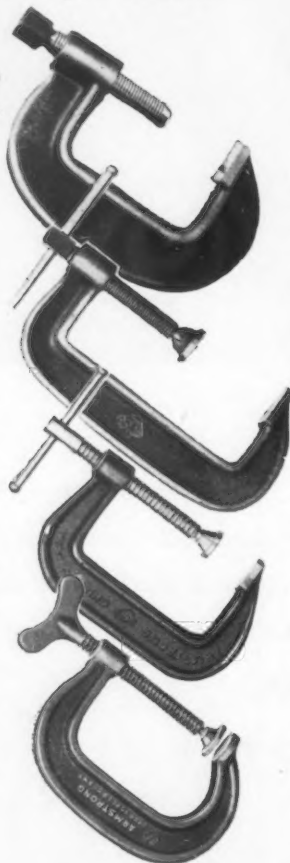
Sources described as close to Mr. Murray stated, "There is no doubt of it. The Oliver case has broken the 'Little Steel' formula. The system of rating pay is strictly 'out' from now on."

# ARMSTRONG



### DROP FORGED "C" CLAMPS

ARMSTRONG Heavy Duty "C" Clamps are used day in and day out to lift and carry these giant automobile body dies where the least spring, or slip in clamp or screw would spell disaster.



ARMSTRONG Heavy Duty "C" Clamps have strength and stiffness unknown in other clamps; have a uniform quality that can be safely depended on for not only ordinary, but extraordinary work. Heavy and correctly engineered designs with long hubs, extra large alloy steel screws and bodies drop forged from special steel, heat treated to give extra strength and stiffness.

You will find the same quality in ARMSTRONG Drop Forged "Medium Service," "Light Service," "Extra Deep Throat," and "Tool Makers" "C" Clamps—7 types each in all sizes. Write for Catalog C-39.

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ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms



**AWARDED TROPHY:** Sheffield Corp., Dayton, Ohio, has been awarded the National Machine Tool Builders Association's trophy for the greatest fourth-quarter increase in 1942 in dollar value of machine tools shipped during that period. Tell Berna, general manager of the association, has announced. Sheffield reported an increase of 224 per cent in value of machines shipped during the quarter, while at the same time the company was setting new records in producing precision measuring instruments and gages.

Unable, previously, to act on out-of-industry wage actions based on the formula as the recent West Coast aircraft industry decision, the meat packers wage freeze and the broad adjustments granted non-ferrous miners and lumbermen, Murray now seems to have within his hands the tool necessary to successfully fight the continued use of the formula in the steel industry.

At the same time that the formula is being fought, the future of the War Labor Board itself is threatened as every effort is expected to be turned toward dishonoring the Board in the eyes of the President through charges of acting on policies other than his and those of James F. Byrnes, Director of Stabilization.

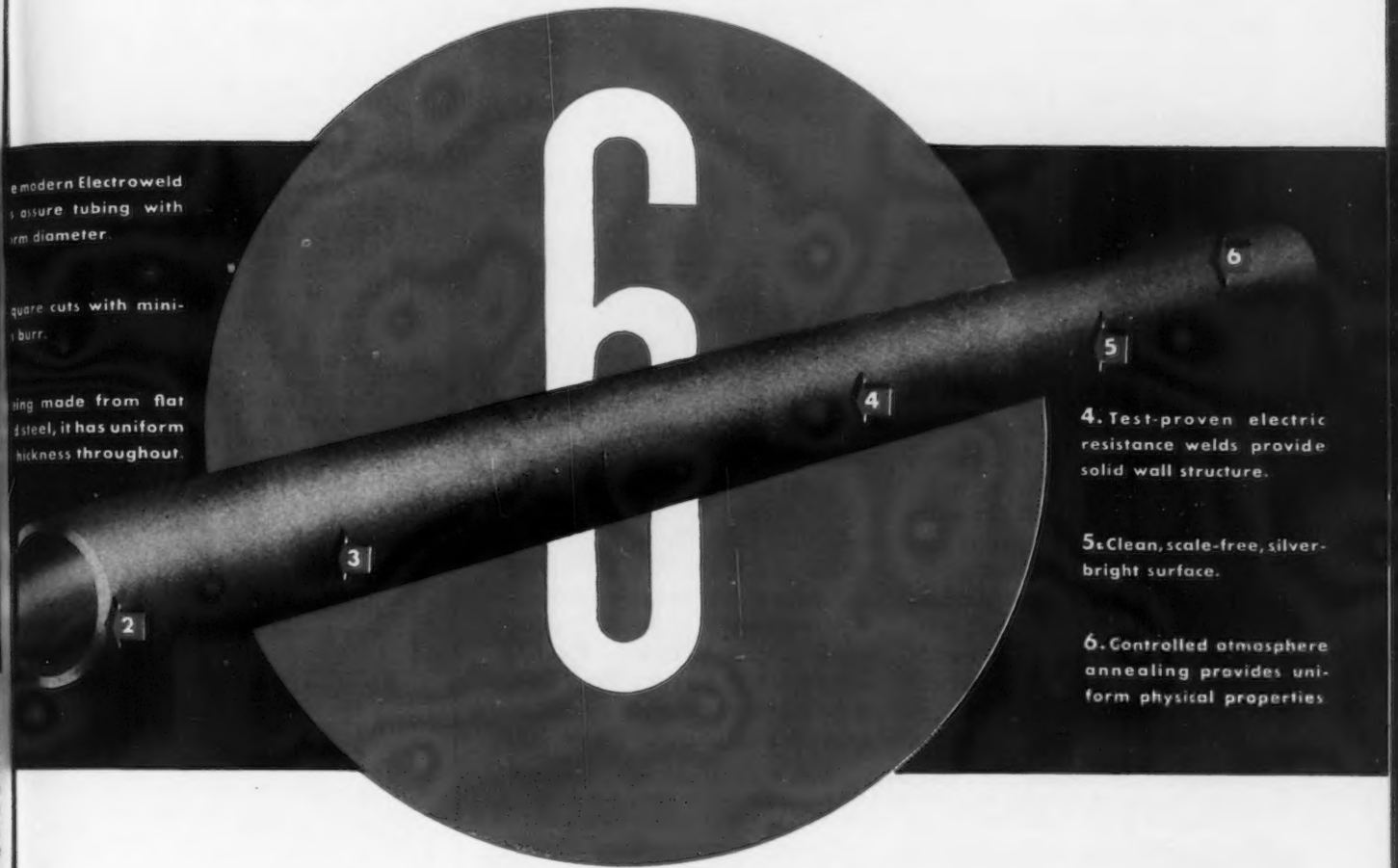
With the unions having a foot in the steel industry's door and John L. Lewis barking after the industry's coal supply on the wage score the life expectancy of the "Little Steel" formula looks limited.

# ix Electroweld FEATURES TO MEET YOUR RIGID REQUIREMENTS

Modern Electroweld assures tubing with uniform diameter.

Square cuts with minimum burr.

Made from flat steel, it has uniform thickness throughout.



4. Test-proven electric resistance welds provide solid wall structure.

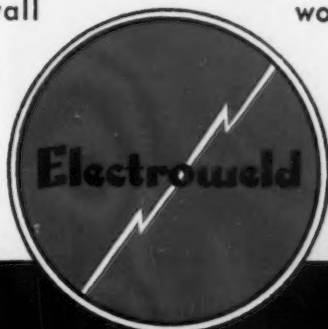
5. Clean, scale-free, silver-bright surface.

6. Controlled atmosphere annealing provides uniform physical properties.

Electric resistance weld tubing provides economical and dependable results for most pressure and mechanical applications. And since Electroweld Tubing is made on America's most modern electric resistance weld mills, no other make of welded tubing has greater uniformity and dependability. You can be assured of uniform wall thickness, uniform diameter, solid wall structure at the weld, uniform

physical properties, and clean, scale-free silver-bright surface as well as a lathe cut with minimum burr. Best of all, Electroweld can maintain this uniform and dependable production to your specifications.

The entire facilities of the Electroweld Steel Corporation are now devoted to the war effort, however, when peace be ours, we would appreciate serving you with our high quality product.



**Electroweld STEEL CORPORATION • OIL CITY • PENNA.**  
Manufacturers of pressure and mechanical steel tubing



## Critical Labor Area Turns Away Applicants

Boston

• • • While Springfield is still listed as an area of critical labor shortage, many metal working plants there are receiving more applications for work than there are vacancies. The recently opened Pratt & Whitney East Longmeadow plant is actually turning away hundreds each week. There

are, of course, some shortages such as highly skilled mechanical trade workers and common laborers, but a surplus of run-of-the-mill type of factory workers that must be trained. Some are applying for work to escape the draft, but a majority want to insure themselves a steady income during the duration.

These facts along with many others which have come to light recently show the manpower problem to be local in character.

## TIME is the FOURTH DIMENSION of a SPRING

IN OUR very brief discussions about springs in our advertisements we have tried to be untechnical. However, there are Mickey Finns among spring problems, one of which is illustrated below. It concerns a grouping of conditions where a spring must supply the accelerating force to a mechanism, that is, a spring which will make a certain mass move over a certain space in a given time (or a certain moving mass stop in a given time, as in a shock absorber). These problems,

involving a variable force, masses, frictional effects, etc., are mastered, not too easily by a formula as shown. They are well beyond the sphere of rule-of-thumb spring makers, will make many a qualified M. E. reach for aspirin. Such calculations are merely indicative of the specialized knowledge required. For qualified spring engineers, such as those at Hunter, they are simply part of a day's work of finding the right spring for the job—the ONE right spring for the job.

ISSUE YOUR ORDERS . . . We'll see them through. If you need springs for fighting equipment or for equipment essential to war production, write, wire or telephone us. We'll make them to your specifications or design and make them.



HUNTER PRESSED STEEL COMPANY, LANSDALE, PENNSYLVANIA

## NWLB Makes Stand On 48-Hr. Overtime

Washington

• • • The National War Labor Board has defined the extent of its jurisdiction in the matter of overtime pay. NWLB approval is not required for payment of overtime rate for hours worked in excess of 40-hr. when such payment is made in accordance with provisions of the Fair Labor Standards Act or any other similar federal, state or local law, or by the provisions of a collective bargaining agreement, or by the past practice of the employer, the Board stated.

If none of these laws or provisions applied, overtime pay may not be given at more than straight time rate to hourly-rated or salaried employees, without prior approval of the Board, the statement explained.

The Board pointed out that an employer "is under the same obligation with respect to overtime pay as if he had adopted a 48-hr. week before the order was issued."

## Industry to Meet May 2 On Steel Production Plans

Pittsburgh

• • • Approved by Donald M. Nelson and H. G. Batcheller a national conference of steel leaders, WPB officials and union leaders has been tentatively scheduled at Pittsburgh, May 2, for the purpose of expediting steel production through the Labor-Management Committees according to Philip Murray, CIO head and president of USWA.

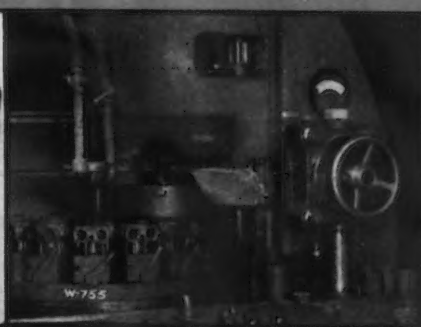
This meeting, it is said, will culminate a series of district meetings which are to be attended by the various Labor-Management Committees throughout the steel industry. One of such meetings already has been held at Pittsburgh. The balance are expected to have been completed by April 25 and according to plans of the union will have brought together labor-management groups in the steel industry from the entire United States, exclusive of the West Coast.

On the tentative schedule of the subjects will be such items as absenteeism and improvement of inefficiencies which may be holding back steel output. A thorough study of the causes of absenteeism will be discussed.

The prime purpose of all the meetings will be to get out the maximum production of steel, says Phil Murray.

## "PUT IT ON THE BLANCHARD"

### CHECK THESE ADVANTAGES OF BLANCHARD GRINDING



*Oil burner pump parts ground on the Blanchard No. 18 Surface Grinder.*

★ **Production**

★ **Adaptability**

**Fixture Saving**

**Operation Saving**

**Material Saving**

★ **Fine Finish**

★ **Flatness**

★ **Close Limits**

THE BLANCHARD NO. 18 SURFACE GRINDER is used to rough and finish grind the oil burner pump parts shown above. They are first ground from the rough, then they are normalized and ground again. All boring and drilling operations are located from the flat Blanchard ground surfaces. After machining, all parts are finish ground on the Blanchard. Twelve pump bodies are ground at once on fixtures mounted on one base plate. The base plate is held magnetically, therefore the chuck may be cleared quickly for a change of jobs. The cast iron pump bodies are 6 inches in diameter. .012" of stock is ground off one side to limits of  $+.0003''$  —.0001" at a rate of 48 pieces per hour.



..... Especially  
valuable on jobs like  
the one illustrated.

*The* **BLANCHARD**  
**MACHINE COMPANY**  
64 STATE STREET, CAMBRIDGE, MASS.



Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners. \*





## Tool Engineers in Session Next Week

••• Preliminary details of the technical sessions to be held by the American Society of Tool Engineers in Milwaukee, March 25 to 27, have been announced by Otto W. Winter, president of the society. While the machine and tool exhibition to be held coincident with the technical meeting will open officially on Thursday morning, March 25, technical sessions will not

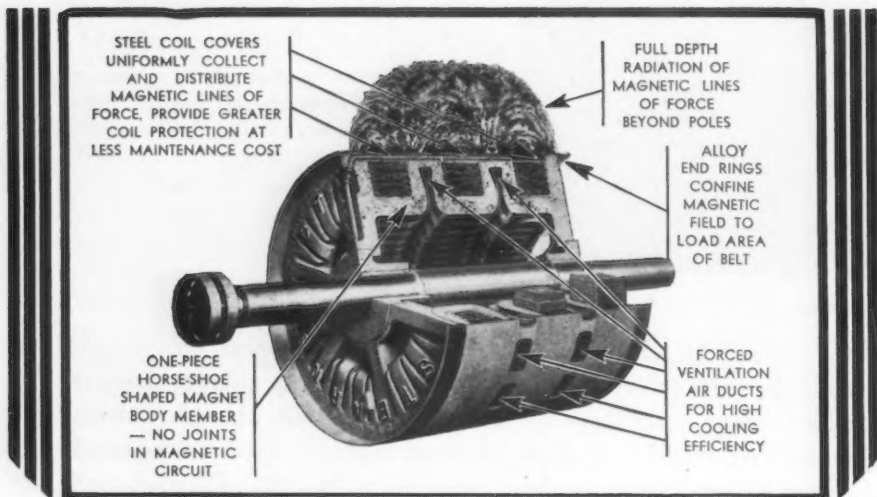
get under way until Thursday evening.

The first technical session will deal with "Machineability of Metals" with particular emphasis on the machining characteristics of NE steels. A paper on this subject will be presented by Prof. O. W. Boston, University of Michigan. Other topics to be covered include "Machineability Ratings of

Metals" and "Cutting Fluid Recommendations".

Three sessions are scheduled for Friday. At 10 a.m. a symposium on "Increasing Tool Life" will be held with discussions by Axel Lundbye, chief engineer, Crowell-Collier Publishing Co.; R. M. Goodsell, Racine Plating Co., Inc.; and G. Walter Esau of E. F. Houghton Co., scheduled so far.

The various methods of salvaging cutting tools will be presented and discussed at the second symposium Friday afternoon. Three papers scheduled for this session are "Tool Salvage by Low Temperature Brazing", by H. W. Foege, mid-western manager, Eutectic Welding Alloys



# Stearns

## MAGNETIC PULLEYS

Progressive better engineering is back of every Stearns Magnetic Pulley—years of pioneering development and testing—hundreds and hundreds of satisfactory, profitable, trouble-free installations that make Stearns pulleys industries' choice.

Shown above are just a few of the many original and distinctive features that stamp Stearns Magnetic Pulleys the outstanding most

for the dollar value today.

For efficient, economical, automatic separation, concentration, purification or reclamation there is a size to fit your needs, readily installed in your conveying system. Available also in self-contained mobile units.

It will pay you to investigate Stearns Magnetic separation methods.

WRITE FOR BULLETIN 302

# STEARNS MAGNETIC MANUFACTURING CO.

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SEPARATORS—CLUTCHES—BRAKES—DRUMS—MAGNETS

### Miniature Steel Mill Solves Plane Problem

••• A baby steel mill that turns out ingots weighing only 13 lb. is playing an important part in America's expanding warplane program, officials at the Westinghouse Research Laboratories disclosed recently. Howard Scott and William Johnson, Westinghouse research metallurgists, used the mill to replace a thermometer manufacturer's dwindling supply of Kovar (a special metal alloy) and avert a threatened break in production of temperature gages for bomber and fighter planes.

Co.; "Tool Salvage by Silver Brazing" by A. M. Setapen, industrial engineer, Handy & Harman; and "Tool Salvage by Welding with Cast H.S.S. Rods", by L. C. Gorham, Gorham Tool Co.

The new problems introduced by the increase in numbers of women employed in machine shops will be discussed at the evening meeting on Friday. Papers are scheduled by Dr. B. I. Beverley, personnel director Republic Drill & Tool Co., and a speaker from the Willow Run bomber plant of the Ford Motor Co.

Saturday morning's session will be devoted to the discussion of various new production techniques. In this session will be presented a paper on "Producing Gears to Finished Dimensions without Machining", by R. J. Goldie, vice-president, Timken-Detroit Axle Co.; "New Methods and Tools for High Speed Machining of Aircraft Parts" will be the topic of a second paper by Arthur A. Schwartz, chief tool research engineer, Bell Air-

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**SPECIAL PARTS  
OR 24-HOUR  
PRODUCTION**



A battery of  
DoAlls in the  
production line  
of a large air-  
craft plant.

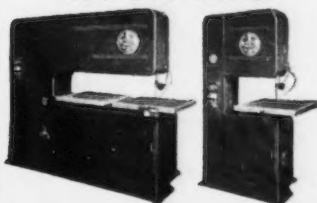
● The DoAll is doing its bit—and a very big bit—wherever metals, alloys or plymetals are cut and shaped.

Steady streams of parts for guns, jeeps, planes, trucks, tanks, flow over its work table. Anything from a 2000-lb. gun slide to a 2-oz. instrument part—15-ft. channel forms, blocks a foot square, all kinds of molds, dies and liners, form tools, gauges, machine parts.

DoAll follows a straight line with precision accuracy—follows any contour design and gives a smooth finish requiring no further machining—does internal and external sawing, filing, polishing.



## THE BIG FIVE



DoAll Contour Machines for rapid internal and external sawing and filing of any metal or alloy. Priced from \$1,000 to \$5,000, each model with motor.

## FASTEST METAL CUTTING METHOD

Because of its speedy, accurate performance, a great deal of shaper, milling and lathe work is switched to the DoAll. Time schedules are whittled down to astonishing new lows. A day's work in an hour—an hour's work in ten minutes—these are typical DoAll results.

### Let Us Show You

A factory trained man will call with a DoAll and demonstrate many amazing metal-sawing short cuts on your own work.

### Write for this Book

"DoAlls on Production," a picture story of performance in many different plants. Interesting and informative.

## CONTINENTAL MACHINES, INC.

1311 S. Washington Ave., Minneapolis, Minn.

Local DoAll offices (See Telephone Directory) distribute these machines. They also sell and service DoAll Grinders, Gage Blocks, Band Saws and Files, Parts and Accessories.

ing special dies is easy  
and quick on the DoAll

All cuts sector gears in  
each. Former meth-  
od 30 min.



## DoAll Grinder

Finest made for high precision surface grinding. Adaptable to wet or dry grinding.



## DoALL GAGE BLOCKS



81 to each set. Come in 3 accuracies:  
WORKING SET, 8 millionths of an  
inch \$295.00  
INSPECTION SET, 4 millionths of an  
inch \$350.00  
LABORATORY SET, 2 millionths of an  
inch. Price on application.



craft Corp., while Malcolm J. Judkins, chief engineer, Firth-Sterling Steel Co., will discuss the high speed milling of steel using negative rake carbide tools.

Saturday afternoon's session will have papers on "Latest Developments in Glass Gages", by T. J. Thompson, manager, industrial division, Corning Glass Works; and "Future Possibilities of Induction Heating" by Frank

W. Curtis, chief engineer, Van Norman Machine Tool Co.

The meeting will close with a dinner Saturday night at which Brig. Gen. H. F. Safford, chief of the production service branch, U. S. Army Ordnance, will be the principal speaker.

The annual directors' meeting of the society will be held Thursday, while the entire meeting will be opened by

## 28-Ton Condenser Completed in 19 Days

... In the Oswego, N. Y., plant of Oil Well Supply Co., a big 28-ton surface condenser for a new ocean-going tanker was completed in just 19 days.

The men in this U. S. Steel plant worked around the clock to do the job in record time, and a special freight train was necessary to speed the condenser to its destination, the big California yard operated by W. A. Bechtel & Co.

In the 19-day job, nearly 10 miles of three-quarter inch brass tubes with a surface area of about 10,000 sq. ft. were built into a compact steel shell.

a "Preview" dinner at the Hotel Schroeder on March 24.

Tying in with the technical sessions will be the "War Production Edition" of the Machine and Tool Progress Exhibition at the Milwaukee Auditorium, at which new devices and products to simplify and speed war production will be on exhibit for the nation's tool engineers. Well over 100 equipment makers will exhibit and many new devices will be shown for the first time, including an entirely new process for assembling of aircraft structures and a new aluminum welder.

## Labor Committee Set-up in WPB Steel Division

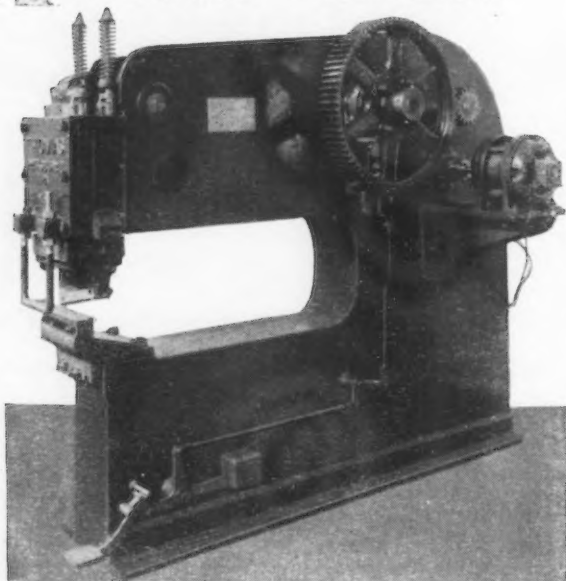
Washington

... Donald M. Nelson, WPB Chairman, has appointed a labor advisory committee in the Steel Division, it was announced on Monday. The following CIO-USW executives form the seven-man committee:

Philip Murray, President; David J. McDonald, secretary-treasurer; Clinton S. Golden, assistant to the president; Van A. Bittner, assistant to the president; Lee Pressman, general counsel; James J. Thomas, executive board member and Joseph Germano, executive board member.

The committee is expected to work with H. G. Batcheller, Steel Division Director in attempting to solve the industry's labor problems. It is expected that such current subjects as absenteeism and slow-downs, including labor dislocations because of the fact that some parts of the industry may cease work will form topics of discussion and solution.

## Thomas Steel Frame Vertical Punches



DESIGNED AND BUILT  
BY THOMAS

Built in wide  
range of capacities  
and throat depths

Favored for use in shipyards and car-shops  
and wherever steel is fabricated. Equipped with interchangeable  
tools for punching and shearing.

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MACHINE MANUFACTURING COMPANY  
PITTSBURGH, PA.

PRESSES • DIES • METAL-FORMING MACHINERY

BENDING AND STRAIGHTENING MACHINES • MULTIPLE DRILLS

FABRICATING MACHINERY

# We're not interested in ZOOT SUITS

but we are interested  
in the phenomena  
of change...

We're not rug cutters, and we're distinctly not "right with the rags." We don't wear a "solid suit of threads," padded at the shoulders like a lunatic's cell, with the "jut cuts" and the "reat pleats," the "cleave sleeves" and the "drape shape." That sartorial throw-back of a juvenile ego is definitely not down our alley.

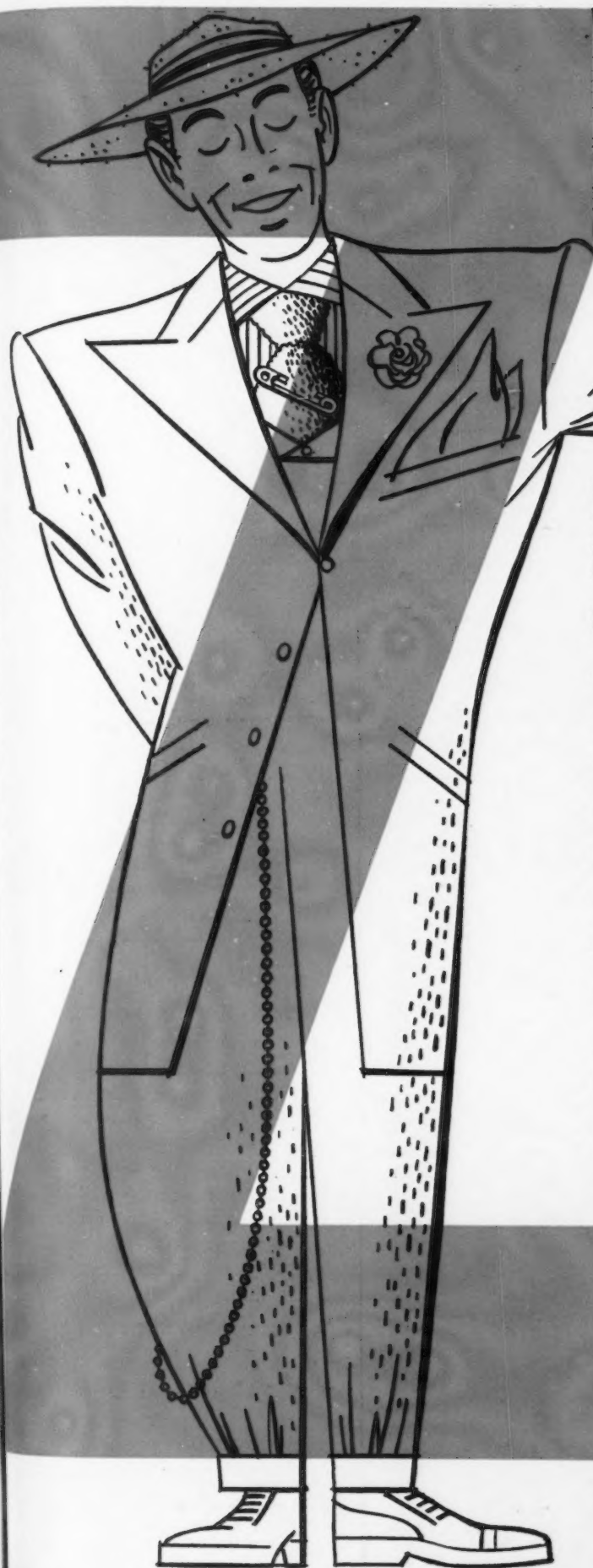
We're specialists in internal grinding problems, and Zoot suits (we fervently pray) won't wield their foolish influence upon the wheels of industry . . . but many a simple fad has!

When a boy and a girl once sat in a hammock, and he thrummed a mandolin and she softly sighed, "I just love your new soft collar" — the celluloid collar market quietly vanished from this earth . . . And the horse-and-buggy business employed a million men — until an explosive contraption, deplored as a dangerous fad, noisily disemployed them and put ten times their number to work.

No, we're not interested in Zoot suits, but we are interested in the phenomena of change. And this is the fastest-changing period in all of industrial history. As a result, many businesses, seemingly on the rise, are actually on the brink of failure in the post-war world of better and cheaper materials.

We've developed many new techniques in grinding these materials, and we believe that this knowledge can be of greater value to manufacturers today than ever before. Bryant's Consulting Service is available to you at all times, and we urge you to call upon us now!

SEND FOR THE MAN FROM BRYANT



BRYANT



**BRYANT CHUCKING GRINDER CO.**

SPRINGFIELD, VERMONT, U. S. A.



## Report on Sub-Contracts Demanded

### Washington

• • • Col. Robert Johnson, Chairman of the Smaller War Plants Corp., has requested that the Under Secretaries of War and Navy, the Chairman of the Maritime Commission and the Director of Treasury Procurement give him a report by April 7 on the "extent and terms upon which prime contractors with the government have

let sub-contracts," it was announced March 10. Colonel Johnson attached a list of 252 of the major war contract holders, to which the inquiry is to be confined.

The report when made public will disclose that subcontracting by large companies has been extensive, and will tend to refute charges that the Army, Navy and Maritime Commis-

sion have been derelict in directing contracts to smaller companies, War Department officials said. The number of subcontracts entered into by these major contractors is said to run into the thousands.

In this letter to the services in which the request for the report was made, Colonel Johnson reminded them that under the provisions of the SWP Act it was his duty to take "appropriate action about subcontracting upon fair and equitable terms in the greatest volume practicable." Colonel Johnson referred to a memorandum dated Dec. 15, signed jointly by Under Secretaries Patterson and Forrestal, and WPB Chairman Nelson, which was sent out to prime contractors urging an extension of subcontracting. "Field reports," he added, "fail to indicate any effective response."

"In order to carry out the Congressional mandate, we must know how effective sub-contracting methods are," Colonel Johnson's letter stated. It went on to request a report to the Smaller War Plants Corp. which will show, as of March 1, for the corporations listed: (a) the number and dollar value of prime and subcontracts; (b) the methods being used by the corporations to increase sub-contracting, and (c) methods used to insure that subcontracting is being done on a fair and equitable basis.

### Speed Up Movement of War Materials, Eastman Asks

• • • In an effort to speed up the movement of war materials and more fully utilize the existing freight-car supply, Joseph B. Eastman, director of Defense Transportation, has appealed to shippers to remove dunnage, nails, strapping and other debris from cars to permit immediate reloading without first moving the cars to repair or other tracks for cleaning by railroad forces.

### Second Head Appointed to WPB Alloy Steel Branch

• • • Louis E. Creighton, Detroit, has been appointed chief of the Steel Division's Alloy Steel Branch by H. G. Batcheller, Director of the Division. Mr. Creighton succeeds William J. Priestley, whose resignation was announced on Saturday. Mr. Creighton formerly was chief of the recently created Aircraft Alloy Steel Section

# Free

## A DURABLE WIRE GAUGE CHART

to those in metal working mills to whom it would be useful. Printed in 4 colors, 16" x 22", laminated and mounted on 1/4" fiber board. Originally offered in June, 1942, the few remaining will be mailed on a "first come, first served" basis.

THE TORRINGTON MANUFACTURING CO., Torrington, Conn.

CLIP THIS AD AND KEEP THE CHART HANDY FOR DESK REFERENCE

## WIRE GAUGES

WASHBURN & MOEN, AMERICAN STEEL & WIRE CO. & ROEBLING (FOR STEEL WIRE)  
AMERICAN, OIL BROWN & SHARPE (FOR NON-FERROUS SHEET AND WIRE)

7/0 .490	3 .2437 .2294	12 .1055 .0808	21 .0317 .0285	30 .0140 .0100
6/0 .4615 .5800	4 .2253 .2043	13 .0915 .0720	22 .0286 .0253	31 .0132 .0089
5/0 .4305 .5165	5 .207 .1819	14 .080 .0641	23 .0258 .0226	32 .0128 .0080
4/0 .3938 .4600	6 .192 .1620	15 .072 .0571	24 .0230 .0201	33 .0118 .0071
3/0 .3625 .4096	7 .177 .1443	16 .0625 .0508	25 .0204 .0179	34 .0104 .0063
2/0 .331 .3648	8 .162 .1285	17 .054 .0453	26 .0181 .0159	35 .0095 .0056
1/0 .3065 .3249	9 .1483 .1144	18 .0475 .0403	27 .0173 .0142	36 .0090 .0050
1 .283 .2893	10 .135 .1019	19 .0410 .0359	28 .0162 .0126	37 .0085 .0045
2 .2625 .2576	11 .1205 .0907	20 .0348 .0320	29 .0150 .0113	38 .0080 .0040

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MANUFACTURING COMPANY TORRINGTON CONNECTICUT  
SPRING COILING MACHINES - MILL EQUIPMENT - SPECIAL MACHINERY

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# HERE'S "MUD IN YOUR EYE" SCHICKLGRUBER!

★ "Mudding" the core for a vital aluminum casting . . . an important operation in speeding the production of Nazi Exterminating Equipment. The skill and experience of this core and mold finisher, symbolizes the outstanding quality of Nationals' sand and permanent mold aluminum castings. Good enough is not enough for Uncle Sam. That's why American fighting equipment is the best in the world. National aluminum castings are used in practically all of Uncle Sam's fighting equipment. So, with slicks\* in the hands of experienced men "pasting" and "mudding" cores, it's mud in your eye Schicklgruber.

*\*Name of tool used in pasting and mudding*



## ALUMINUM CASTINGS

BUY U. S. WAR BONDS & STAMPS

**THE NATIONAL BRONZE & ALUMINUM FOUNDRY CO.**  
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MAKERS OF QUALITY SAND AND PERMANENT MOLD ALUMINUM CASTINGS





## may be the answer to *Your* problem, too!

Amercoat has successfully solved so many different problems pertaining to corrosion and contamination that the chances are it may solve your problem, too! This cold-applied thermoplastic coating protects the contents and makes metal or concrete tanks and structures impervious to the corrosive action of such varied materials as:

**AVIATION GASOLINE • SEA WATER  
AMMONIUM NITRATE • ALCOHOL  
40% FORMALDEHYDE • LACTIC ACID  
50% and 75% CAUSTIC SODA  
CONCENTRATED MAGNESIUM CHLORIDE BRINE  
DRINKING WATER**

### COLD APPLIED • By Conventional Methods

Amercoat is an inert, tasteless, odorless compound which is also dielectric to a high degree. It is compounded and pigmented to meet each individual requirement. Tell us your problem and we'll answer it with Amercoat to meet your specific need... or tell you Amercoat is not the answer. Amercoat is fully described and some of its many uses are illustrated in an interesting informative booklet. Write for your copy today.

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**AMERICAN PIPE AND  
CONSTRUCTION COMPANY**

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### Cited for Award

•••The following additional companies have recently been awarded the Army-Navy "E" for outstanding performance on war work:

American Lens Co., Inc., New York.  
Bossert Co., Utica, N. Y.  
Broderick Co., Muncie, Ind.  
Campbell Soup Co., Central Division, Chicago.  
Carpenter Container Corp., Brooklyn.  
Century Ribbon Mills, Inc., York, Pa.  
Chicago Extruded Metals Co., Cicero, Ill.  
Columbus Bolt Works Co., Columbus, Ohio.  
Columbia Steel and Shafting Co., Pittsburgh.  
Pittsburgh Steel Co., Monessen, Pa., and Allenport, Pa., works.  
Crucible Steel Co. of America, Park Works, Pittsburgh.  
Dann Clothing Co., Inc., Long Island City, N. Y.  
Donner Hanna Coke Corp., Buffalo, Ohio.  
Eagle Tool & Machine Corp., Springfield, Ohio.  
General American Transportation Corp., Ordnance Division, East Chicago, Ind.  
Holley Carburetor Co., Detroit.  
Houdaille-Hershey Corp., Oakes Products Division, North Chicago.  
Kensington Steel Co., Chicago.  
Lederle Laboratories, Inc., Pearl River, N. Y.  
Machlett Laboratories, Inc., Springdale, Conn.  
Mosler Safe Co., Hamilton, Ohio.  
Motor Products Corp., Detroit.  
Mt. Vernon Woodberry Mills, Inc., Tallassee Mills, Tallassee, Ala.  
Mullins Mfg. Corp., Salem, Ohio; and Youngstown Pressed Steel Division, Warren, Ohio.  
Murray Co., Atlanta.  
Pangborn Corp., Hagerstown, Md.  
Pine Bluff Arsenal, Chemical Warfare Service, Pine Bluff, Ark.  
Potash Co. of America, Carlsbad, N. M.  
Safety Car Heating & Lighting Co., New Haven, Conn.  
Seiberling Rubber Co., Barberton, Ohio.  
Singer Mfg. Co., Bridgeport Plant, Bridgeport, Conn.  
Steel Cooperage & Coating Co., Detroit.  
Stokely Brothers & Co., Inc., Stokely-Van Camp, Indianapolis, Ind.  
Taft-Peirce Mfg. Co., Woonsocket, R. I.  
Tennessee Valley Authority, Nitrate Plant No. 2, Wilson Dam, Ala.  
Union Metal Mfg. Co., Canton, Ohio.  
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.  
War Department Searchlight Mirror Plant, Cincinnati.  
Youngstown Metal Products Co., Girard, Ohio.  
Western Gear Works, Seattle.  
Handy & Harman, Bridgeport, Conn. (star)  
Western Electric Co., New York (star)  
Associated Spring Co., Barnes-Gibson-Raymond Division, Worcester.  
Jenkins Brothers, Bridgeport, Conn.  
**Maritime Commission "M"**  
Radiomarine Corp., New York.  
Jenkins Brothers, Bridgeport, Conn.  
Bethlehem-Sparrows Point Shipyard, Inc., Baltimore.  
**Army Ordnance Banner**  
Mid-West Forging & Mfg. Co., Chicago.

### WPB Streamlines Field Work Philadelphia

•••In an effort to eliminate duplication of effort and travel, each field representative of this region's WPB special projects, scrap processors and industrial scrap sections is now handling work in all three sections. Formerly each representative's work was confined to one of the three scrap groups. This is said to be the first WPB district to adopt such a plan.

# Records in Building Cargo Liners Revealed

Kearny, N. J.

•••The delivery of quality cargo liners of the Maritime Commission C-2 type on an average of 82 days ahead of contract time by the Federal Shipbuilding & Dry Dock Co., is a new record announced here this week.

"Records in swift construction, from keel to delivery, have been set at Kearny since the first Maritime contract was signed on March 9, 1938," says an editorial in the "Halyard," company publication. "That's true of the five C-1's and the six C-3's as well as the 35 C-2's the company has delivered. Federal was the first shipbuilder voted the 'M' for work on C-2 type ships. The fastest time scored thus far in C-2 construction was Federal's delivery of the steamship African Sun in 140 days last Dec. 22."

## Aluminum, Iron Ore in Renegotiation Exemptions

•••A joint regulation defining the exemption of certain types of war contracts and subcontracts from provisions of the war contract renegotiation statute has been issued by the Under Secretaries of the War and Navy Departments, the Chairman of the Maritime Commission and the Director of Procurement, Treasury Department.

According to this regulation, contracts or subcontracts for the following products are among those exempted under subsection (i) (1) (ii) of section 403 of the sixth supplemental national defense appropriation act, 1942, as amended:

Aggregates consisting of washed or screened sand, gravel or crushed stone. Aluminum ingots and pigs; alumina; calcined or dried bauxite; crude bauxite. Antimony ore, crude; antimony ore, concentrated; antimony metal; antimony oxide. Chromium ore and ferrochrome not processed beyond the form or state suitable for use as an alloy or refractory in the manufacture of steel; bichromates; chromic acid. Copper ore, crude; copper ore, concentrated; copper billets, cathodes, cakes, ingots, ingot bars, powder, slabs and wirebars. Fluorspar ore; fluorspar fluxing gravel; lump ceramic ground fluorspar; acid grades of fluorspar. Crude iron ore, pig iron. Lead ore; refined lead bars, ingots and pigs; antimonial lead bars, ingots and pigs. Magnesite; dead burned magnesite. Metallic magnesium pigs and ingots. Manganese ore; ferromanganese; silicomanganese. Ferromolybdenum; calcium molybdate; molybdenum oxide. Refined silver bars, shot, powder and grains. Refined pig tin. Tungsten ore and concentrates; ferrotungsten; tungsten powder. Vanadium ore and concentrates; ferrovanadium; vanadium pentoxide. Zinc anodes, balls, oxides, powder and slabs.

# ROEBLING Wires

## ROUND... FLAT... SHAPED

A FEW WIRES TYPICAL  
OF ROEBLING'S BROAD  
SPECIALTY PRODUCTION

ROUND WIRE

SHAPED WIRES

FLAT WIRE FOR  
SURGICAL INSTRUMENTS

WHERE  
"Ready-as-  
delivered"  
HELPS SAVE  
SOLDIERS' LIVES



Are your war-production facilities being tied down by the need for processing materials before "getting down to business"? Let Roebling supply you with flat, round or shaped wires... and see how much more of your manufacturing time can go into actual *final* fabrication and assembly of products for Victory.

Roebling Flat Wire for surgical instruments is a good example of how this Roebling service works out. Rolled to customer's exact specifications, this high grade, high carbon steel is ready "as-delivered" for final shaping with a minimum of operations, speeding manufacture, putting more instruments into Army surgeons' hands to save soldiers' lives...

Giving this kind of service in wire making and wire finishing is a war job that Roebling's exceptional facilities and skilled personnel alone make possible. Put your tough wire problems up to Roebling. Prompt action on war orders.



JOHN A. ROEBLING'S SONS COMPANY

TRENTON, NEW JERSEY

Branches and Warehouses in Principal Cities



## Post-War Production Control Seen Hidden in NRPB Program

### Washington

••• The National Resources Planning Board post-war program submitted to Congress by the President last week proposes a strangle control over all industry by the paralyzing hands of government bureaucrats. If the plan were adopted, the steel industry, the aluminum and magnesium industry, and other basic metals industries would find themselves in a partnership with the government, tightly supervised by WPB, OPA and other war-created agencies. Not only would this be true, but some observers see a hidden threat of continued government operation of production scheduling even after the peace crisis passes in the NRPB guarantee of universal employment.

Competent observers say that the government could not support its employment plan through leaf-raking, boondoggling, and public works because the cost would be so prohibitive that no tax structure would be adequate to support it. In lieu of this, then, it is being predicted that something like the Wickard plan of the government guaranteeing production beyond peacetime demand, buying the goods, and distributing them through a scheme similar to the Food Stamp Plan, is being privately contemplated.

In the main Congress has received the program with little favor. Even before its submission the House had turned down requests for funds to continue NRPB. Members of the House such as Everett M. Dirksen, Republican, of Illinois, and Howard

W. Smith, Democrat, of Virginia, have publicly said that Congress should write its own post-war legislation rather than accept a cut and dried recommendation from the White House. A special committee on post-war planning has been proposed by Senator Walter F. George, Democrat, of Georgia, and it is likely that a House committee will likewise be formed.

"Labor to share in management" is another of the Board's recommendations which strikes at private control of property. It is pointed out that organized labor has become almost an instrumentality of government and the placing of government men and labor representatives on private companies' boards of directors may have the effect of absolutely giving the control of means of production over to the government.

The Board says that in some sectors of the economy, public interest may be served better by the use of mixed corporations than by either wholly private enterprise or outright government ownership and operation.

"A variety of arrangements are possible depending mainly on the relative extent of government's participation. On the one hand the government's proportionate interest in the corporation might be so great that the corporation would be operated essentially as a private enterprise," says the report blandly. The report declares that the government is already taking considerable part in the management of the many war industries which have been greatly ex-

panded by the use of Government funds.

The recommendation in this connection follows: "In the post-war period the mixed corporation might be an effective form of organization for certain plants in those industries of crucial importance in wartime and in which the government has made great wartime investments. In this category are aluminum, magnesium, other basic metals, synthetic rubber, some chemicals, shipbuilding and aircraft. Through the mixed corporation the government could participate in the selection of the areas and the business units which are to continue to operate in these industries. Moreover, government representatives could check the degree to which public assistance to these industries in the form of contracts or special subsidies was being used to develop improved products and to reduce costs. Other fields in which this type of joint enterprise could be used for new operating units are urban development, housing, transport terminal reorganization, air transport, communications and electric power.

"Another sphere of action for these joint efforts might be the control for the government of certain patents and properties seized from enemy aliens, and of domestic patents of basic necessity in the production of raw materials. In this latter instance, the corporation might choose to operate the properties directly or license them to private operators."

The report recommends that the post-war steel industry and other metals producing industries continue to produce at the same level and that if buying power has decreased in the reconversion period, that steel and other metal products be stockpiled. Government subsidy would of course be made available and this is a hint as to how NRPB would provide universal employment.

It is altogether probable that the post-war planning Congressional committee will give serious consideration to only a relatively minor part of the Board's recommendations, including perhaps some of those having to do with an expanded social security and assuring employment to the armed forces when they return to the pursuits of peace. But present indications are that scant consideration will be given to suggestions to socialize industry by means of a set-up of "mixed corporations."

**ARMY LOCOMOTIVES:** These O-6-O side tank engines built by H. K. Porter Co., Inc., Pittsburgh, for Army service develop unusual power for their small size.



## Employment Quota Plan Evolved By Post-War Business Committee

••• A new approach to postwar planning, involving "employment goals" or "quotas" for all major industries, is being considered by business through its Committee for Economic Development, of which Paul G. Hoffman, president of Studebaker, is chairman. This plan and other postwar projects and viewpoints of industrial planning groups were revealed to *THE IRON AGE* this week by Leo H. Rich, associate of Walter Dorwin Teague, the industrial designer, who has been active in postwar planning.

Mr. Rich, as head of Mr. Teague's postwar activities, is a member of the business Committee on National Policy of the National Planning Association; of the group studying postwar markets for the Committee for Economic Development; and of the board of consultants for New York University's Institute on Postwar Reconstruction.

The theory under which the Committee for Economic Development's markets group is proceeding, said Mr. Rich, is that if employment can be maintained at a level of 56 million workers, ten million more than were employed in 1940, peak peacetime markets will be assured. Most previous business thinking on production and employment has been in the following orthodox pattern: sales must determine production, production must determine employment.

Breaking away from this, CED suggests that each industrial group fill a certain employment goal; employment will determine the industry's production; and sales, because of full employment and payrolls, will automatically follow.

What this means in concrete figures for various industries was set forth tentatively at a recent two-day conference of the group, said Mr. Rich. The conference, called by David C. Prince, vice-president of General Electric Co., studied a tentative national peacetime production goal of \$145 to \$165 billion annually, to be maintained after the war. (This year's production is expected to reach \$160 billion, of which \$85 billion will be war goods).

According to the Department of Commerce's breakdown of potential markets based on the most optimistic figure of \$165 billion, worked out by S. Morris Livingston, economist of

the Department, which was presented to the group, the passenger car industry should employ enough workers to reach a \$5,700,000,000 production, or twice the production of 1940; factory machinery should employ enough to reach \$1 billion production; electrical apparatus and equipment a little more than \$1 billion; machine tools and accessories \$1 billion; general and miscellaneous machinery and equipment almost \$2 billion; business motor vehicles \$3 billion. All of these groups should plan on producing twice 1940's output. Two and a half times 1940's production is expected from radio apparatus and phonographs, with the estimate of \$1 billion. Less than double the 1940 figure is expected from refrigerator, washing machines and sewing machines at \$800 billion. Aircraft output is expected to rise to only \$400 million from 1940's \$300 million, with the same figures applying to ship and boat building.

These figures, Mr. Rich pointed out, do not represent predictions. He described them as goals, "like par on a golf course." They have not yet been translated into numbers of units or

numbers of workers. How they will be broken down into company or community goals, should the plan be followed, has not been worked out. However, Mr. Rich emphasized, the plan is intended to be flexible, to steer away from regimentation and "freezing," and particularly to take into consideration the development of new products and new uses of materials.

CED, while it is purely a business committee and not a government agency, was sponsored by Jesse Jones and has its headquarters in the Department of Commerce. Its object is "to prepare for the attainment of high levels of employment and production." Among its trustees are Ralph E. Flanders, president of Jones & Lamson Machine Co.; M. B. Folsom, treasurer of Eastman Kodak Co.; Charles R. Hook, president of American Rolling Mills Co.; and Charles F. Kettering, vice-president of General Motors Corp.

While the individual business executive can, through a knowledge of industrial production goals, visualize the volume of business above the prewar level for his own product, Mr. Rich believes his most constructive thinking can be done on new products and on re-conversion.

This brings up the question of models to be produced immediately after

**WORLD'S FIRST AMPHIBIOUS GLIDER:** A close-up view of the U. S. Navy's amphibious glider (first of its kind in the world) during the tryout at the Philadelphia Navy yard. The glider is loaded to capacity with twelve fully-equipped men. She was towed aloft by a Catalina seaplane and landed on the Delaware river. Gliders like this could be used for making fast landings of beachhead parties.

*International News Photo*





the war. "The present plan of some makers of automobiles, refrigerators, stoves and other producers of consumers' durable goods," said Mr. Rich, "is to get into quick production on 1942 models and take immediate advantage of deferred demand. They believe that while people who need these goods immediately are taken care of, there would still remain a tremendous market of people who want improved goods and this might counteract a falling off of markets when deferred

demand is met. There is great fear of a lull after two or three years, with a bad effect on the total economy.

"However," he said, "I don't believe the manufacturers can get away with this. They, especially the automobile makers, have educated the public to expect new models each year, and there has been so much talk of the automobile of the future. In the second place, the manufacturer of parts has learned so much during the war that he is ready to bring out improved

versions of his part. Competition between parts makers may force the hand of assemblers. Also, the competition between manufacturers and producers of new materials will make the public aware of the new products possible."

Mr. Rich believes that for a period after the war, materials must continue to be controlled. Unless allocation continues for a time, he said, little fellows will have difficulty in securing materials and competing for suddenly released demand.

One of the most ambitious plans for post-war development, said Mr. Rich, is that developed by Dr. Alvin H. Hansen, special economic advisor to the Board of Governors of the Federal Reserve System, on which enabling legislation is now being prepared. Dr. Hansen proposes that municipalities, states and counties condemn and buy large land areas, through Federal and state grants. Sections of this land would then be sold to private industry to building in accordance with coordinated plans. This would mean not only new housing, said Mr. Rich, but roads, terminals, express highways, etc.

This plan is being explored under the aegis of the National Planning Association, of which Charles E. Wilson, vice-chairman of WPB, heads the trustees. One government agency estimates that five or six million new housing units are needed now, and that one to one and a half million will be needed every year for at least 20 years.

Discussing the problems of the individual business executive, Mr. Rich said that his primary consideration must be re-conversion. "The manufacturer," he said, "must survey his war production machinery to see what type of peacetime product he can make, just as he did with his peacetime machinery in converting to war production. He may not be able to go back to his old product, because of tapering off of war work, or an overcrowded field.

"He must plan to take advantage of new materials and new designing possibilities. He may make, for example, bathtubs stamped out of steel like automobile bodies, instead of cast in iron. He might investigate, for example, a new type of refrigeration in which the deep freeze unit is in one part of the kitchen and separate cabinets have various temperature controls. Some of the aircraft companies are already planning to enter the field of prefabricated housing."

# DEMPSEY industrial furnaces



Continuous pusher type hardening furnace, automatic quench, and continuous belt conveyor type draw furnace.

.. and Then ..

forge shops will resound with the din of screeching metal . . . tool rooms will be taxed to capacity and merchandising, as we knew it before Pearl Harbor, will be the order of the day! However, war production must go on . . . Victory must be won, but we can do this without losing sight of a post-war program which will be just as feverish as the one we are now striving to complete. In war or in peace, Dempsey engineers have contributed largely to industrial success wherever and whenever heat treating problems were involved. Whether large or small furnaces are required, our designers will meet the need exactly with equipment engineered for efficiency and trouble-free, economical operation.

WRITE FOR BULLETINS



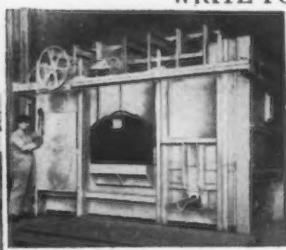
We point with pride to the fact that **DEMPSEY FURNACES** were selected by such firms as . . .

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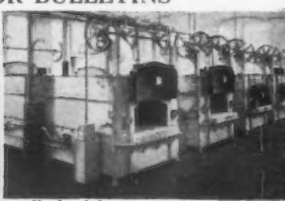
and many others.



Pot furnace for heat treatment in liquid bath.



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Carburizing, annealing and general heat-treating oven furnaces.

**DEMPSEY INDUSTRIAL FURNACE CORPORATION**

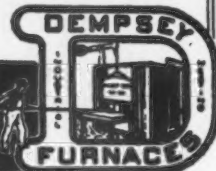
SPRINGFIELD, MASSACHUSETTS

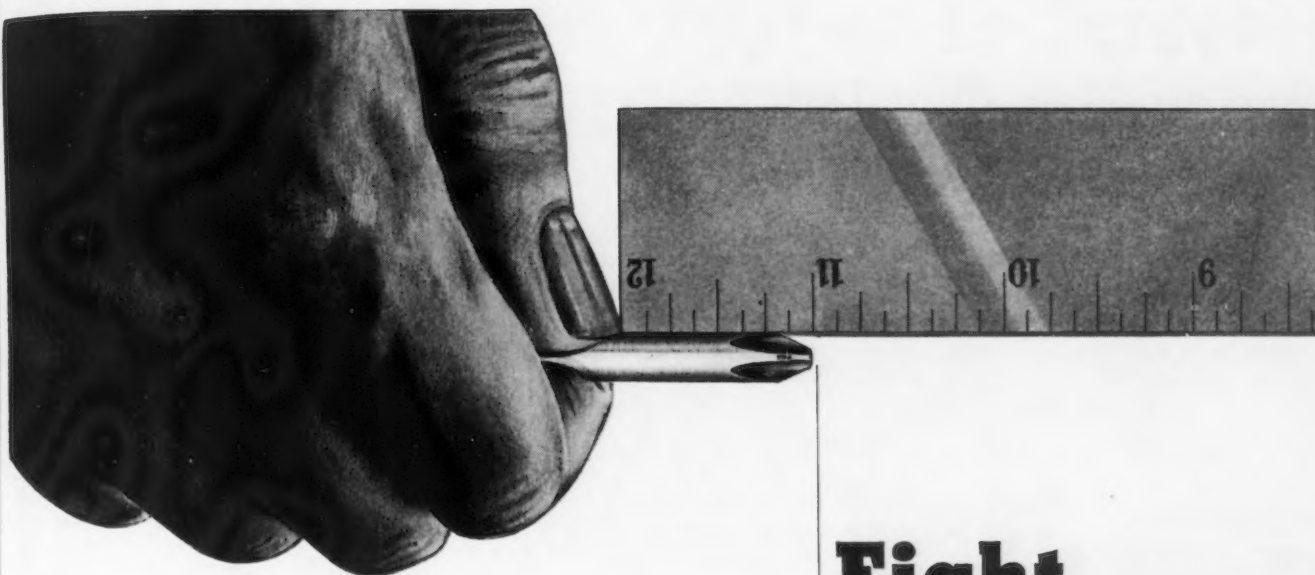
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**S**OME Apex-Phillips power bits have as many as *eight* and more useful lives. And *all* Apex-Phillips bits (except a very special few) have *several* useful lives.

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The cost of reconditioning is a fraction of that of new bits. You save money. And together we save vital tool steel. So if you use Phillips screws, use Apex-Phillips Bits, get multiple service life, and save. Write for Catalog 15.

# APEX

**THE APEX MACHINE & TOOL CO., DAYTON, OHIO**

Manufacturers of Power Bits for Phillips, Slotted Head, and Clutch Head Screws; and Hand Tools for Phillips and Clutch Head Screws.

Phillips Bit Reconditioning Service for the Pacific Coast at the Burklyn Co., 3429 Glendale Blvd., Los Angeles, Calif.



## Rerollers Given Clear Track On Steel for Farm Implements

Washington

••• In recognition of the fact that a schedule of 40-hr. a week fixed 60 days ago for rerolling rail mills to produce reinforcing bars is inadequate to also produce the amount of rail

steel required by the farm implement program, WPB last Thursday told the rerolling mills that they could roll as much steel for farm implements as they could get orders. However, it was pointed out by H. G. Batcheller,

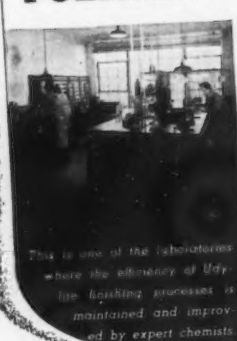
steel division director, that rerolling mills are restricted by quotas in respect to reinforcing bar schedules.

The first quarter allocation of steel to farm implements was 200,000 tons, one quarter of which was to be bessemer and old rail. The part the rerolling mills got of this allotment was not sufficient to keep the 20 companies at a minimum operation. To prevent the threatened shut down of the mills, the steel division concentrated reinforcing bar production in the rerolling mills, and when this happened a 40-hr. a week schedule proved to be inadequate to handle all orders. Though the overall allotment to farm implements was less for the second quarter—only 170,000 tons, there is still provision for another 50,000 tons of bessemer and rerolling rail.

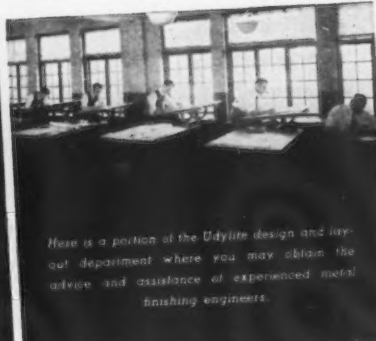
Although the new order will benefit all rerolling mills, it will be especially helpful to those companies in the farm belt which have facilities for rolling and experience in the making of agricultural steel. Among the more important of these are: The Pollak Steel Co., Cincinnati; Calumet Steel Co., and the Inland Steel Co., both Chicago; Laclede Steel Co., St. Louis and the Sheffield Steel Corp., Kansas City.

# UDYLITE

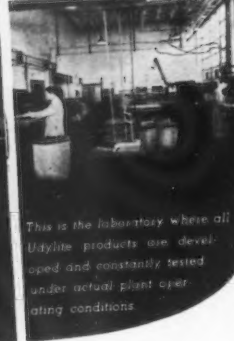
HEADQUARTERS FOR ELECTROPLATING,  
POLISHING AND ANODIZING INFORMATION



This is one of the laboratories where the efficiency of Udy-lite finishing processes is maintained and improved by expert chemists.



Here is a portion of the Udy-lite design and layout department where you may obtain the advice and assistance of experienced metal finishing engineers.



This is the laboratory where all Udy-lite products are developed and constantly tested under actual plant operating conditions.



For prompt, dependable metal finishing information, call on Udy-lite. No organization is better equipped to give you information gained from installing plating, polishing and anodizing departments in many leading manufacturing plants throughout the country. • Trained plating engineers and electrochemists are at your service. These men know metal finishing and they can help you plan a new installation or revise your present one for



greater efficiency. They know, also, that you want information quickly. • Udy-lite has a complete line of equipment . . . second to none in terms of quality and efficient performance. • and supplies . . . for every metal finishing need. Salts, acids, anodes, buffing and polishing materials—everything required. • Call Udy-lite for prompt service on your finishing requirements. You pay no more for Udy-lite dependability.

## THE UDYLITE CORPORATION

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Chicago  
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## Industrial Truck Orders At All-Time High in 1942

••• Domestic bookings of electric industrial trucks and tractors during the calendar year 1942 totalled 5103 units, an all time high, according to the Industrial Truck Statistical Association, Chicago.

The net value of chassis only booked during the year totalled \$21,881,510. The bookings and their value by months follow:

	Units	Value
January . . . . .	324	\$1,262,812.40
February . . . . .	427	1,495,750.86
March . . . . .	376	1,664,988.00
April . . . . .	571	2,229,791.00
May . . . . .	760	3,283,958.82
June . . . . .	414	1,503,738.10
July . . . . .	462	1,830,869.49
August . . . . .	218	865,832.00
September . . . . .	513	2,235,755.03
October . . . . .	259	1,294,739.70
November . . . . .	188	943,264.00
December . . . . .	591	3,270,010.60
Totals . . . . .	5103	\$21,881,510.00

## Installs Electric Furnace

Sheffield, Ala.

••• The George King Co. of Sheffield has installed an electric furnace for the manufacture of steel castings. The furnace, with a capacity of about one and a half tons per heat, was installed by the company to supplement its gray iron foundry.

# Salem's Ingenuity Applies to Furnaces And Auxiliary Handling Equipment



## Example, Bomb Heat Treating and Handling is Now Only a 3 Man Job

● The outstanding performance of Salem furnaces may well be attributed to Salem's experience and knowledge of plant production operations. Salem, therefore, builds and designs furnaces as well as auxiliary handling machinery, which co-ordinates the operations of all equipment to speed production and lower costs. With this thorough understanding of manufacturing procedure, Salem engineers can also offer dependable furnace designs which will

dovetail into existing handling mechanisms. The bomb heat treating furnace, pictured above, gives evidence of Salem's complete engineering service. The furnace and quenching equipment, including conveyors, racks, charging and discharging apparatus, are all of Salem design. This war equipment . . . big and important as

it is . . . requires only **THREE MEN** for operating as well as supervision. Write to Salem about your problem—use Salem's experience in war production equipment.



# SALEM ENGINEERING CO. . . SALEM, OHIO



## Briefly Told—

### Factories to Go Abroad Under Lend-Lease; Metal Surfacing Developed

• Edward R. Stettinius, Jr., Lend-Lease administrator, said March 1 that eight industrial plants operating in the United States have been acquired up to now for Lend-Lease shipment abroad (three for Australia;

three for Russia; two for India) and that negotiations are pending for the acquisition of three additional plants. Total value of seven of the eight is less than \$12,000,000. Value of the eighth is being determined. At the same time

Lend-Lease has spent over half a billion dollars for production facilities completed in this country which are net additions to U. S. industrial capacity. Two of the plants for Australia were specifically requested by Gen. Douglas MacArthur. They will make cans.

The largest factory acquired for Lend-Lease shipment is the Ford Motor Co. tire making plant, which cost \$8,000,000. This plant was not in production. In Russia it is expected to produce 1,000,000 military truck tires annually. Other plants acquired are as follows—Drum-making plant, cost \$218,722; can-making plant, cost \$52,469; can-making plant, cost \$86,000; sawmill, cost \$334,497; oil refinery, cost \$1,900,000; machine shop, cost \$138,651.

• The State Commission of Labor and Industry of Michigan has announced special wartime regulations permitting the employment of minors in types of work formerly barred to them. Although boys and girls must procure working permits from local school authorities, they are now permitted to operate passenger elevators; can engage in welding operations if they are 16, provided adequate ventilation exists; can work on "non-hazardous, power driven machines" if they are properly guarded but not on power driven meat cutting or paper cutting machines, and may engage in occupations where weight lifting to 50 lbs. is required, while boys 14 and 15 and girls 14 to 18 may lift 35 lbs.

• The remarkable growth of metal and tool tipping in this war is accomplishing a generation's development of the trend within a few years, says the Office of War Information in a current release. The pressure of speeding up war production has prompted industrialists to find new time saving and material saving methods in carrying out production schedules. Out of this need to save has developed new techniques in metal surfacing and tool tipping which will be carried on and further developed just as welding was retained and improved after World War I.

• A new light-weight decking material with myriad potential applications has been announced by Goodyear Tire & Rubber Co. It is produced in a thick liquid and is applied by spraying or with a steel trowel.

• Total earnings of General Electric employees amounted to \$382,039,000 for 1942, compared with \$257,400,000 a year earlier, an increase of 48 per cent. The average number employed during 1942 was 139,939, compared with 109,689 during 1941. Average annual earnings per employee amounted to \$2730 in 1942 compared



The Farrel Type TT Roll Grinder grinds straight, convex or concave rolls to exact symmetry and accuracy and with the highest finish attainable by grinding.

The patented crowning and concaving mechanism built into the machine produces a mathematically accurate curve of correct shape for a crowned or concaved roll, exactly symmetrical on both halves of the roll. The mechanism is the adjustable,

single eccentric type, readily accessible and quickly set. Only a minimum of skill is required in setting up and operating the machine.

Many other important features of Farrel Type TT Roll Grinders contribute to superior performance, better finish and high output. They are described in detail in our new Bulletin No. 113, which we shall be glad to send without obligation on request.



**FARREL** FARREL-BIRMINGHAM COMPANY, Inc.  
ANSONIA, CONN.  
New York • Buffalo • Pittsburgh • Akron • Los Angeles

# WILL "Know How" CURE YOUR STEEL TROUBLE?



If you're having trouble with steel, here's a Frasse suggestion you may find helpful.

Visiting you, at regular intervals, is some steel distributor's representative. He packs a lot of information on steels—the grades and sizes available, physical properties, possible substitutes, specifications, fabricating short cuts, heat treatments, and so on.

Trouble is, he can't answer your question until you ask it. So why not pump him—and take full advantage of his "know how"? Next time, for instance, a Frasse representative calls—put him to work on your specific problems. Tell him your steel troubles.

He's spent years in the steel game—and

the information, short cuts, purchasing "kinks", and shop tricks he's collected in his travels will surprise you. More important—they can help you.

At the moment, for example, Frasse representatives have a new, up-to-date chart of government alloy steel "specs", showing comparable AISI, SAE, and AMS numbers. It's especially useful these days. Ask for a copy, or, if you want it at once, write or call: *Peter A. Frasse and Co., Inc., Grand Street at Sixth Ave., New York, N.Y. (Walker 5-2200) • 3911 Wissahickon Ave., Philadelphia, Pa. (Radcliff 7100-Park 5541) • 50 Exchange Street, Buffalo, N.Y. (Washington 2000) • Jersey City, Hartford, Rochester, Syracuse.*

## Frassé

### Mechanical and Aircraft STEELS

SEAMLESS MECHANICAL AND AIRCRAFT TUBING • COLD FINISHED BARS • ALLOY STEELS • AIRCRAFT STEELS  
STAINLESS STEELS AND TUBING • COLD ROLLED STRIP AND SHEETS • WELDED STEEL TUBING • DRILL ROD



with \$2346 in 1941, and were the highest in the history of the company. There were 160,299 employees on the company's payroll on Dec. 31, 1942, including 48,719 women. This represented an increase during the past year of 37,459 in the total number of employees and 19,322 in the number of women employees.

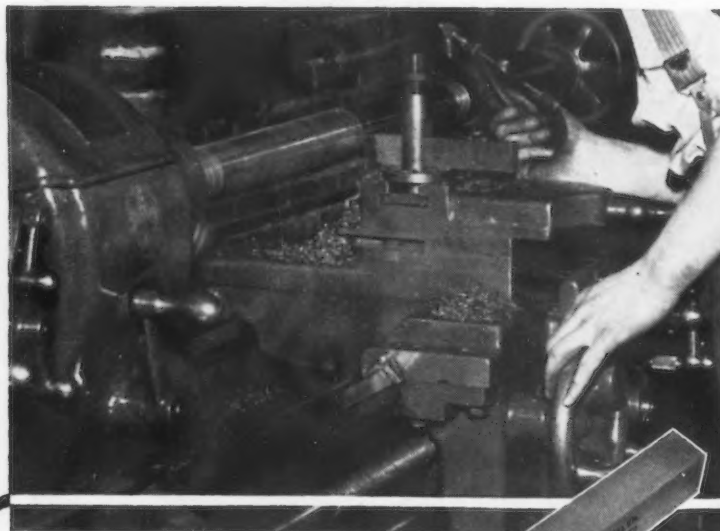
• Specifications which prescribe the proper method of packing war materials for overseas shipments were

made available March 3 by WPB. The specifications are designed to insure proper delivery of war materials in usable condition, and with the most efficient utilization of containers and of transportation and distribution facilities. A booklet, "Army-Navy General Specifications for Packaging and Packing for Overseas Shipments" was released to manufacturers and shippers engaged in the war program. It is for use by the armed forces, war agencies, and contractors. Copies may be obtained at the Containers

Division or at any of the cooperating agencies.

• An efficient and fully equipped aircraft repair shop is now located somewhere in the jungles of northeastern India, the OWI announced in a recent news release. It is equipped with Lend-Lease supplies and services long lines of Allied fighters and bombers, 50 per cent of them American warplanes. India is also doing her share in the war effort by reviving shipyards for construction of vessels, servicing and repairing United Nations naval vessels and building an aircraft factory and several airfields.

• Petroleum Administrator for War Harold L. Ickes recently announced that he had formerly applied to WPB for the materials necessary to complete to New York and Philadelphia terminals the 20-in. petroleum products pipeline which will soon be started from Texas. If approved, this second Texas-East Coast petroleum artery will supplement the 300,000 barrels-a-day delivery of crude and light heating oils through the 24-in. War Emergency Pipeline with 235,000 barrels a day of refined petroleum products. Construction of the 836-mile section of the 20-in. pipeline from the Houston-Beaumont refining areas of Texas, to Norris City, Ill., and Seymour, Ind., was approved in January.



# KENNAMETAL\*

STYLE II

## Supports Production Schedules

New methods and types of equipment have permitted the attainment of production volume previously thought impossible for the metal machining industry.

KENNAMETAL, however, was produced with capabilities which met the demands of a stepped-up manufacturing system. It provided the steel cutting industry with a tool that will operate at extremely high speeds . . . that slices through metal even under the demands made by severe interrupted cuts, irregular surfaces, and high Brinell steels. There is a KENNAMETAL tool that will increase production on your particular job. Use this superior cutting tool for boring, turning, and facing steels in your plant.

Write for your copy of the KENNAMETAL Tool Manual which gives complete information about these tools.

\* INVENTED AND MANUFACTURED IN U. S. A.



# McKENNA METALS Co.

144 LLOYD AVE., LATROBE, PENNA.

Foreign Sales: U. S. STEEL EXPORT CO., 30 Church St., New York  
(Exclusive of Canada and Great Britain)

Trade Mark Reg. U. S. Pat. Off.

## Sewing Wire Saves Time In War Plane Sub-Assembly

Cleveland

• • • In the production of sub-assemblies going into American war planes a form of sewing has been found that makes a 90 per cent saving for unskilled labor. This procedure is the result of a new type stitching wire developed by the American Steel & Wire Co.

The wire permits the stitching or binding of various types of materials and is particularly adaptable to the fastening of rubber, plastics, fibre board, laminated wood and other construction materials to stainless steel or aluminum. Manufacturers use it in the fabrication of non-stressed parts and in the application of rubber sealing to hatch doors, landing gear doors and similar parts. It has a guaranteed minimum tensile strength of 290,000 lbs. per sq. in.

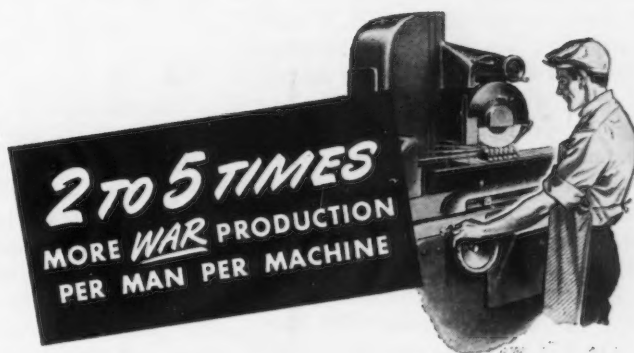
Rigid specifications of the wire permit very little tolerance from the required .051-in. diameter. It will penetrate stainless steel of .030 in. thickness, duralumin of .040 in. thickness or aluminum of .060 in. thickness. Other softer materials such as rubber, wood, asbestos, cork, etc., can be penetrated to a thickness of 3/4-in.

# IMPORTANT NOTICE TO WAR PLANTS CONCERNING POR-OS-WAY DELIVERIES

**WE MUST BE FRANK.** When we first announced the Por-os-way precision grinding wheel a little more than a year ago, we were ready with a plant far exceeding our previous one in size, equipment and man-power. It was, we felt, big enough to meet all demands. But two things have happened. First, the war. Then Por-os-way, making good its promise to increase grinding production 2 to 5 times per man per machine, has literally sky-rocketed in demand. Hundreds of grinder foremen and grinding machine operators want to prove Por-os-way can up production 2 to 5 times for them, want to see what makes it different from other wheels, how its cool action practically eliminates burning, how it takes cuts double or more than previous wheels and grinds in fewer passes, how it can cut faster producing an even *better finish* using a *finer grain*, why it resists loading, holds its corner, reduces dressings necessary.

## ORDERS INCREASED 700%

Orders have poured in. Not at a steady pace but at an ever increasing rate. Our production



is now forging ahead—yet is still not enough to satisfy the full demand for Por-os-way.

## RELIEF IS IN SIGHT

Working 'round the clock was not enough. We needed more plant, more equipment, more men. Work on expanding our facilities is now completed. Greatly increased production is now under way. Again we believe it will be amply big enough to take care of all your demands. Naturally we want every war plant to know the exceptional advantages of Por-os-way wheels. And so, we're doing all we humanly can to keep up on delivery. In the meantime, write A. P. de Sanno & Son, Inc., 434 Wheatland Street, Phoenixville, Penna. for a booklet "Facts About Por-os-way". It gives a complete story.

**POR-OS-WAY\***  
*a new*  
**RADIAC\* PRODUCT**



**A. P. DE SANNO & SON, INC.**  
NEW YORK, CHICAGO, PITTSBURGH,  
CLEVELAND, DETROIT, LOS ANGELES



**PHOENIXVILLE, PENNA.**  
Western Gateway to  
VALLEY FORGE

\*T. M. Reg. U. S. Pat. Off.  
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# CMP Allotment Accounting Plan Presented

• • • WPB last week issued a Controlled Materials Plan Consumer Allotment Accounting Manual intended solely to guide consumers in setting up and keeping records of material allotments, reallocations and the placing of orders for materials. The manual was described emphatically as a guide which was to suggest and illustrate a method of accounting for these specific items but was in no way intended as a compulsory system nor as having any effect on other records which are required under CMP Regulations. It was also emphasized that the manual did not deal with and had no effect on records of actual shipments, receipt or use of materials.

While WPB has made it plain that the suggested recording method is not a required one the substance of their manual boils down to a hearty recommendation of the simplicity of a card record such as they outline. Individual plans which may be better suited to the ramifications of specific businesses are just as satisfactory.

On this page will be found a sample of the proposed record card form. Suggested for use as a standard 5x8 in. card, the form is drawn up to provide space in the heading for the Claimant Agency symbol and major program number, the controlled material item, unit of measure, and calendar quarter. The body of the card provides for recording the date

of entry, description of item or reference quantities received on allotment, quantities reallocated, quantities purchased and unused allotment balance.

Allotments received will be the first entries of the card. Considering all CMP-4 forms together and the War Department's CMP-10, if a CMP-4 is received from a Claimant Agency the allotments may be shown either as a total for the quarter or separately by months. If the Form is used in making allotments between consumers, then only quarterly quantities should be shown. The short Form CMP-5 may also be used in reallocting materials originally allotted on CMP-4 forms. In any event, the quantities allotted on any of these forms should be entered on the card first to establish the balances available for purchase or distribution to other consumers. Separate cards are used for the records of each controlled material.

As an example, the War Department makes an allotment for the second quarter, of 40, 50 and 60 tons of carbon steel for the respective months. On the form, these allotments are re-

See typical entries on sample form shown below.

corded and totaled in the Allotment Balance column to 150 tons. In addition, the Greene Co. reallots 95 tons

of the same material to you. This is also entered as an allotment and is added to the total. Your company in turn is called upon by secondary consumers for allotments and your re-allotments to them are entered in the debit column of the form and deducted from your total of available controlled material. You then place an order for 50 tons with Star Metal Co. thereby exhausting a portion of your allotments and reducing your total as shown in the last entry. Thus, by a simple debit and credit method accurate control of allotments and re-allotments is provided. The plan also suggests that if allotments received from a Claimant Agency run over into the third quarter that a separate card be used for these transactions.

### Recording Small Orders

To minimize the accounting of allotments received, the consumer purchasing Class A products requiring small amounts of controlled materials is not required to record the quantities of controlled materials contained in small orders. No charge is made by the buyer to his allotment account.

A vendor receiving a small order should keep a memorandum of each small order received. When these reach a sizable number the consumer should estimate the quantities of controlled materials required to produce the Class A products required on small orders and post the quantities on separate allotment record cards as an allotment received. The symbol "SO" should identify the card instead of the Claimant Agency symbol and major program number.

### ***Purchase of Controlled Materials***

Many purchase or delivery orders will carry more than one allotment identification. In addition to the allotment identification for major programs and small orders (SO), consumers will place orders for controlled materials for maintenance, repair and operating supplies and these will be identified by the symbol MRO.

From purchase orders identifying allotments with major programs, SO or MRO requirements, the quantities opposite each classification will be

[illegible]

## by WPB As Suggestion

entered on separate forms and will reduce the allotment balance proportionately.

### Accounting for Specific Allotments

When a consumer is operating on several specific allotments from various customers for production requiring controlled materials, it is not required that specific records of the use of each allotment be maintained so long as the records show that his production obtained from the various allotments does not exceed the aggregate authorized production schedules for that product. Self substantiating records showing that total production on specific schedules has not exceeded material allotments are sufficient.

### Order Rejections

If a producer is unable to fill any order for controlled material the consumer will be notified and should reverse the entry on his allotment records to adjust the total available.

### Unused Allotments

When all allotments have been re-

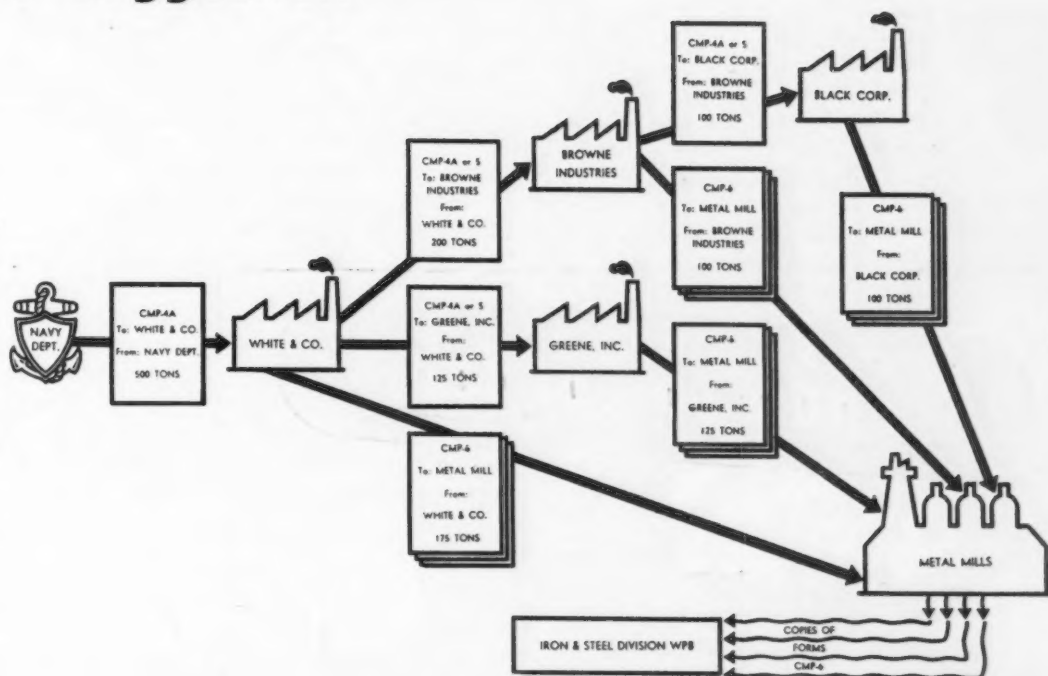
ceived and have been either used or reallocated the allotment record should show an even balance. Sometimes there will be an overage which must be reported to the proper Claimant Agency or Industry Division. The allotment will then be transferred if possible to some other consumer within the same Agency. In the case of a transfer of controlled material the amount should be either removed or added to the allotment balance in your card records as the case may be. This will be either a pay-out in the "re-allotted" column or a receipt in the "received column"—either reflecting in the total balance.

## Procedure Set for CMP Producers

••• Procedures under which controlled materials producers will obtain materials required for incorporation in their products are established by CMP Regulation No. 8 issued March 13 by WPB. The new regulation provides a preference rating of AA-1 and an allotment symbol, X-1, which may be applied to purchase orders for other than controlled materials by those controlled materials producers who apply for and receive specific authorization to operate under the regulation's terms. Applications for this authority should be directed to the appropriate Controlled Materials Division.

Applications for controlled materials or Class A products to be incorporated by a producer in a controlled material item are to be made on Form CMP-4B. In the case of aluminum required for certain listed purposes, however, Form CMP-13 is to be used in making the application.

Allotments of controlled materials will be made to producers in the same manner as allotments for the manufacture of Class A and Class B products. Exception is made to this procedure when the controlled material required is made of the same basic metal as that produced by the applicant. In such cases, requirements



THIS CHART, prepared before the elimination of CMP-6, is substantially correct except that the information formerly required on CMP-6 can now be endorsed on the purchase order. Hence, where CMP-6 is shown being furnished to mills and warehouses on the chart, an endorsement will do.

will be filled only by directives issued according to the terms of CMP Regulation No. 1.

CMP Regulation No. 8 also provides that hereafter no consumer of controlled materials is to include in any bill of materials or application for allotment, requirements for controlled materials needed for the manufacture of the controlled material to be included in his product. In cases where a consumer has already received an allotment of controlled materials for the production of any controlled material, or of a Class A product to be incorporated in it, he is to make an allotment to the controlled materials producer, and the latter is then to cancel the allotment and report this cancellation to the appropriate Controlled Materials Division within 15 days.

The regulation issued today also specifies in detail the manner in which the preference rating of AA-1 and the allotment symbol X-1, which it assigns to approved controlled materials producers, may be used.



## Rejection of Allotments Explained

New York

• • • With announcement of the new CMP Consumer Allotment Accounting Manual comes new emphasis on the subject of mill rejection of allotments of controlled material. In the scurry to obtain allotments this phase may not seem important but since allotments are conditional upon meeting scheduled delivery dates the re-

jection of allotments becomes just as essential as the acceptance.

Moreover, manufacturers are required to accept authorized orders for Class A and Class B products. They must, however, reject low rated orders which will interfere with their production on authorized delivery schedules on higher rated orders.

Manufacturers of Class A products

may turn down an allotment regardless of the preference rating that accompanies it if the authorized production schedule cannot be met—allowing for the granted period of grace.

Barring a AAA rating, orders for either Class A or Class B products must be rejected if an allotment and authorized production schedule for a Class A product have already been accepted.

When engaged in making Class B products to fill unrated or low rated orders, higher rated orders must be accepted unless the former production is necessary to completion of a Class A product on an authorized production schedule.

Industry Divisions and Claimant Agencies have, in some instances, the power to force manufacturers to accept orders not otherwise acceptable under these terms or the provisions of Priority Regulation No. 1.

### New CMP-4A Issued

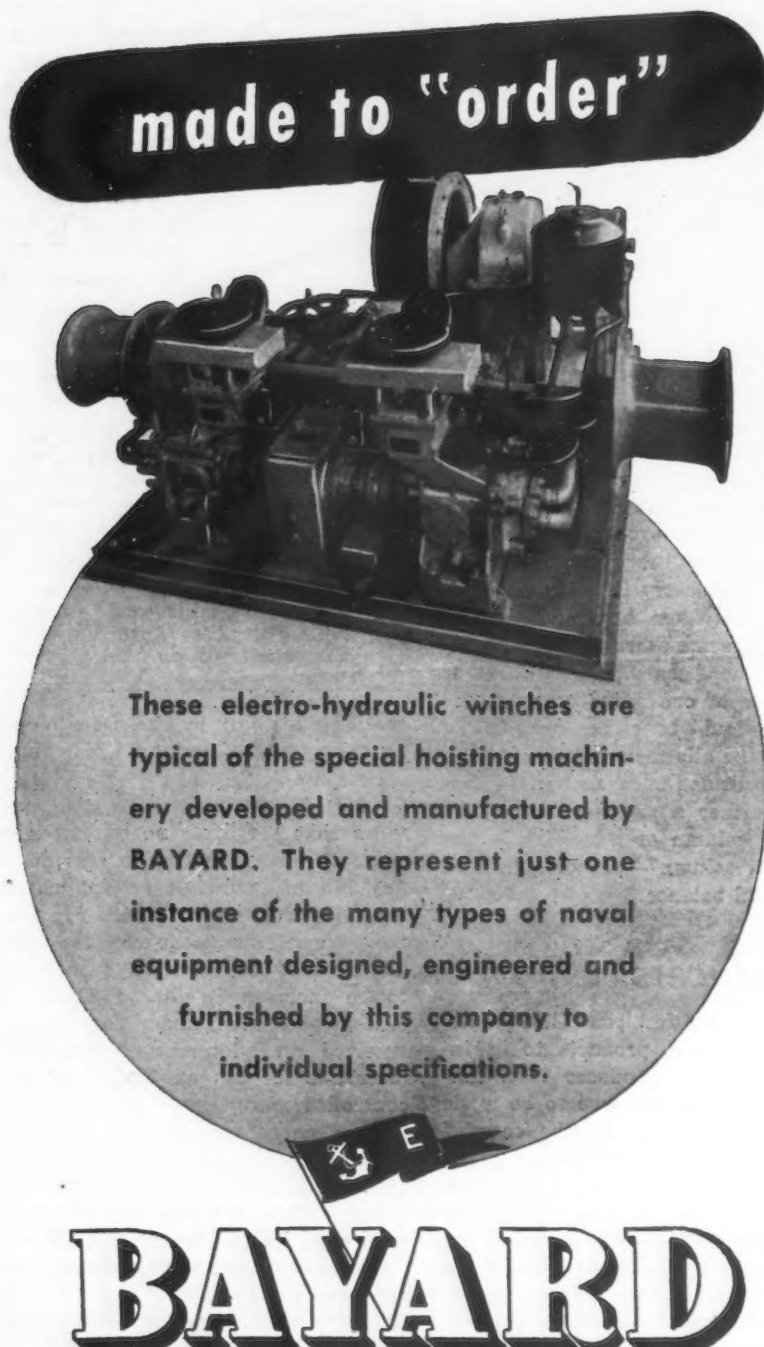
• • • Manufacturers of CMP items identified as Class A products may now apply for their allotments on one of the simplest government forms ever devised. Form CMP-4A, formerly a four-page sheet, has been revised to provide a single, letter-size page, on the reverse of which are printed instructions for filling out the streamlined application.

The revised form, is being mailed today to industry for use in connection with materials to be delivered during and after the third calendar quarter of this year. A similarly simplified form of CMP-4B will be available shortly.

### Lend-Lease Is Claimant

• • • The Lend-Lease Administration is now set up to act as the Claimant Agency for importers in the British Empire and consequently for exporters to those countries here. The effective date of the new export program was announced last week, by the British Ministry of Supply Mission in Washington, as April 1 with the explanation that after that date BEW licenses on allocated materials will be unnecessary.

William J. Button, assistant controller of the mission, termed the new export plan a "program-licensing" system and after the effective date



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These electro-hydraulic winches are typical of the special hoisting machinery developed and manufactured by BAYARD. They represent just one instance of the many types of naval equipment designed, engineered and furnished by this company to individual specifications.

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## Nearly 50 Years of Service to the Steel Industry

In the early days of our steel expansion, before the United States Steel Corporation had been formed, the Charles Dreifus Company had its beginning.

The Charles Dreifus Company, as a broker in iron and steel scrap, still has as its customers some who were its customers nearly 50 years ago (or their successors). We are proud of this record.

Steel companies and scrap producers, as well as such Government agencies as the War Production Board, the Office of Price Administration and the Army and Navy, recognize the important role of the scrap broker in keeping the iron and steel industry operating at a rate that will bring a speedy and victorious conclusion of the war.

We solicit further opportunities to be of service in the movement of iron and steel scrap from industrial plants, railroads and scrap yards to steel plants and foundries.

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DREIFUS**  
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Worcester, Mass.	
Park Bldg.	
Worcester 6-2535	

exporters will be required to make application to the British Ministry of Supply Mission in Washington for a "release certificate" which will have the same effect as the former BEW export license. Two British Empire countries, however, were excluded from the new plan these being Canada and Newfoundland.

Under the new system, Button pointed out, outstanding licenses previously granted will continue valid until June 30. The release certificate, it is understood, will be valid for a period of three months after date of delivery.

### Machine Shipments Clarified

*Washington*

• • • Restrictions on shipment of certain types of industrial equipment frequently leased to users are clarified by Order L-83 as amended last Friday by WPB. The original order by implication required ratings of A-9 or higher before any movement could be made of can-making and closing machinery, leather working, shoe, textile manufacturing machines, etc. Since these types of machines are very often leased rather than sold, the order as amended explicitly permits the lessor to recover his machinery from the lessee on the termination of the lease.

### End-Uses Specified In M-1-i for Aluminum

• • • Companies receiving CMP allotments of aluminum are authorized to use the metal for a specified group of end-products by Order M-1-i as amended March 10.

Aluminum may be used for the purposes listed in the revised order without further authorization. Use of aluminum for any other purpose must have special authorization in addition to the receipt of an allotment.

Delivery of aluminum for April against CMP orders in many cases has been authorized prior to obtaining end-use information. Furthermore, in respect to Class B products, mills and foundries have been authorized to fill orders for aluminum up to 30 per cent of a manufacturer's request for his second quarter allotment.

The amended M-1-i order establishes these controls, effective March 31:

1. High-grade aluminum may be used, without application for permission, only for certain specific purposes, among them combat end-items, aircraft, alloys with other metals, and for additional listed purposes.

2. In a separate list of items, only

### Directives to 200 Steel Firms Control Output

• • • Steel production in the United States is now entirely controlled by the WPB Steel Division through directives issued to more than 200 companies.

These directives, developed last spring and first adopted on a limited scale in July, regulate production of integrated companies which melt their own steel and of non-integrated companies buying steel from other producers for further conversion into steel products.

The directives list the tonnages of specified steel products to be manufactured each month, and are segregated by plant or district for the larger companies. They are based on determinations of the WPB requirements Committee and on war demand for each product as measured by the various product sections of the steel division with the help of claimant agencies.

Through this network of production directives, the steel industry has been geared to the production of the steel products which are needed to meet war and essential civilian requirements. Under CMP, the production directives will assume even greater importance, since the total tonnage of steel al-

lotted to the various claimant agencies will bear a direct relationship to the productive capacity of the industry.

Another objective of the system has been to assure the best possible use of non-integrated companies' facilities. These companies—which number about two-thirds of all companies to whom production directives are issued—receive allocations of steel in definite quantities and forms from specified producers. The suppliers are carefully chosen.

Another phase of the effort to attain fullest use of the industry's facilities has been reflected in the centering of the manufacture of certain steel products (demand for which is limited by war conditions) in fewer companies.

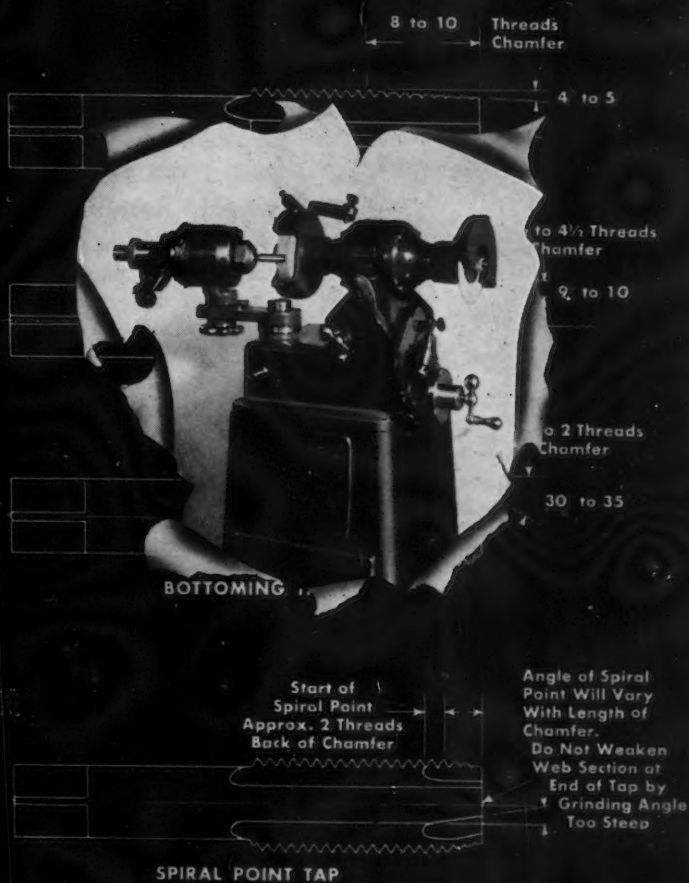
Administration of the system is handled by the Steel Division's Production Directive Committee. The production directive committee now consists of Joseph L. Block, chairman; Charles Halcomb, Harold J. Ruttenberg, Jesse V. Honeycutt, Charles H. Longfield, Edward L. Parker; Carl W. Meyers, and R. W. Shannon, secretary.

# WAR-TIME SHOP RECIPES

## #2 for thread production

GROUND TAPS, THREAD GAGES,  
THREAD HOBS & SPECIAL THREADING  
TOOLS. SPECIAL TAPPING MACHINES

### Recommended Angles for Tap Chamfers



- TAKE (1) All your dull or worn taps  
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Then grind taps on the Reconditioner according to instructions on the wall chart and put them back to work — as good as new.

If you don't have a copy of this wall chart, write for one today on your company letterhead. Ask for Chart No. RTC.

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The policy of providing the very best reaches through every branch of industry, for only through superiority of our men, machines and equipment can victory be secured.

Fenn tool makers, machinists and engineers are building machines and parts that are vital to the war drive. Civilian needs must wait until this job is done; then Fenn can once more turn its facilities to peace time service.

Fenn acts as prime contractor or sub-contractor on Special Machinery, parts and equipment. We welcome inquiries from those who need assistance in either development work or actual production.



## PRIORITIES

low-grade aluminum may be used. Further use of low-grade aluminum is permitted only for items on this list and in items for which high-grade is permitted.

3. Persons desiring specific permission to use aluminum for purposes not otherwise authorized by the order must apply by letter to the Aluminum and Magnesium Division giving full details of the projected use and the CMP allotment number, if any.

In addition, use of aluminum by a manufacturer for purposes for which he was not authorized to use aluminum during the last quarter of 1942; or use in any item or part of more aluminum than was permitted in that quarter for the same item or part; or use of aluminum where another material will serve, is prohibited even if the items affected are on one of the two lists mentioned above.

### Scrap to Remain Scrap

• • • Dealers who accept copper material as scrap may not dispose of it in any other form, except with the specific permission of WPB, it was ordered last Thursday through revision of Supplementary Order M-9-b. This action was taken because some scrap dealers have been purchasing copper scrap, and then disposing of primary shapes which happened to be mixed with the scrap. The amended order is designed to insure complete control of these operations.

### Molybdenum Compounds Placed Under Order M-110

Washington

• • • If the recovery of molybdenum from a chemical compound is commercially practicable, such a compound comes within the scope of molybdenum Order M-110, it was made clear last Thursday by WPB in issuing Interpretation No. 1 to the order. In general, the interpretation says, the only chemical compounds from which molybdenum is considered to be commercially recoverable are primary chemical compounds such as those required to be reported on Form PD-359.

Molybdenum is not considered to be commercially recoverable from secondary chemical products. Order M-110, as amended Jan. 9, places molybdenum under allocation regulations, except for certain small deliveries.

### Nail Kegs Protected

• • • Acting to avert a shortage of nail keg staves and headings which threatens to curtail essential shipments of steel products, the OPA placed these lumber items under a separate price regulation.

The action raises the prices for all lengths of nail keg staves and all diameters of nail keg headings and is calculated to restore normal margins over costs to producers.

### Net Income Statements from Industry

Company	Net Income 1942	Net Income 1941	Remarks
Youngstown Sheet & Tube Co.	\$10,305,705	\$16,124,400	Equal to \$5.66 per common share compared with \$9.13 in 1941.
Jones & Laughlin Steel Corp.	10,141,690	15,499,983	Equal to \$4.49 per common share compared with \$10.85 in 1941. Operations were 103% of capacity.
Crucible Steel Co. of America	4,864,781	7,439,480	Equal to \$7.26 per common share.
The Midvale Co.	3,740,366*		*Includes \$1,337,700 post-war refund of excess profits tax.
United Engineering & Foundry Co.	3,104,998	3,309,297	Equal to \$3.71 per common share compared with \$3.96 in 1941.
Rustless Iron & Steel Corp.	2,644,557	2,334,627	After deductions equal to \$2.76 per common share compared with \$2.42 for 1941.
Alan Wood Steel Co.	739,590	1,051,772	Retroactive wage increase cost \$255,826.
Follansbee Steel Corp.	511,771	445,963	Equals \$1.76 per common share compared with \$1.46 in 1941.
Laclede Steel Co.	352,038	748,796	Equals \$1.71 per common share compared with \$3.63 in 1941.
Barium Stainless Steel Corp.	126,189	—99,129	First profits reported.

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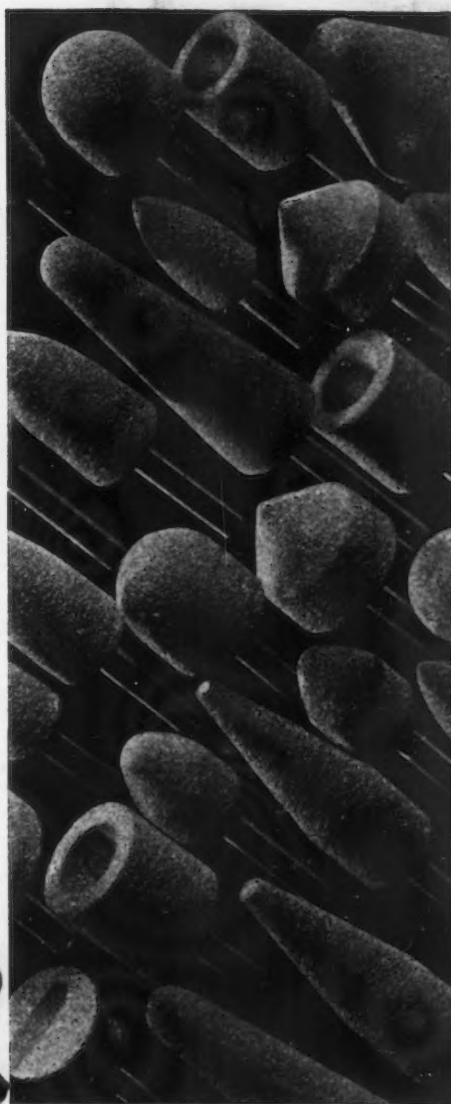
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## This Week's Priorities and Prices

**Gray iron castings** sellers may apply for adjustment of their maximum prices under the conditions set forth in Amendment No. 3 to Maximum Price Regulation No. 244, effective March 13. (OPA-1868)

**Machine tool deliveries** are to be scheduled by a new method set forth in amended order E-1-b. (WPB-2787)

**Mining equipment** production has been placed under strict wartime control by order L-269. (WPB-2812)

**Copper scrap** and copper alloy scrap maximum prices have been revised in Maximum Price Regulation No. 20. (OPA-T-648)

**CMP allotments** of aluminum may be used for a specified group of end products under order M-1-i as amended. (WPB-2804)

**Secondary slab zinc** that fails to meet specifications for prime Western grade must be sold below the maximum price for that grade and less-than-carload lots have been put under a new pricing formula

la through Maximum Price Regulation No. 3, effective March 18. (OPA-T-646)

**Coke producers** are required to file monthly production, distribution and inventory reports with the Bureau of Mines under order M-292. (WPB-2824)

**Non-ferrous mill product producers** who cannot establish ceiling prices under the general maximum price regulation were provided with a procedure to be used instead in order No. 325 under Section 3 (b) of the general regulation. (OPA-T-659)

■ ■ ■

*For copies of above announcements address Office of War Information, Washington, giving announcement number as shown in parentheses after each paragraph. (For example, WPB-600 means announcement 600 issued by the War Production Board.)*

## Revisions to The Iron Age Priorities Guide

• • • The following data, together with all intermediate weekly revisions in **THE IRON AGE**, should be added to **THE IRON AGE Priorities Guide** published with the issue of October 8 to bring the Guide up to date.

### Priority Regulations:

No. 3...Amendments simplify application of preference ratings to telephone and telegraphic orders for scarce materials (3-9-43).

### "M" Orders:

M-1-i...Amended order releases aluminum for specified end products (3-10-43).

M-9-b...Amended order further controls delivery of copper scrap (3-10-43).

M-39...Amended order relaxes restrictions on use of cobalt (3-8-43).

M-81...Amended order directs canners to pack in No. 10 cans the goods required to be reserved in 1943 for armed forces and Lend-Lease (3-12-43).

M-110...Interpretation No. 1 (3-10-43) clarifies that if the recovery of molybdenum from a chemical compound is commercially practicable, such a compound comes within the scope of the order.

M-216-b...Order is designed to prevent indiscriminate stripping of new vehicles to supply parts for emergency use (3-8-43).

M-292...Order requires coke producers to file monthly reports with the Bureau of Mines (3-12-43).

### "E" Orders:

E-1-b...Amended order establishes new method of scheduling machine tool deliveries (3-9-43).

E-9...Order tightens control over production and distribution of certain precision measuring instruments and testing machines (3-10-43).

### "L" Orders:

L-1-e...Amendment abolishes time limitation applying to production of certain off-the-highway motor vehicles (3-13-43).

L-6-c...Amended order makes provision for authorizing scheduled production of domestic laundry equipment (3-12-43).

L-23-b...Amended order modifies restrictions on sale of electric ranges (3-8-43).

L-30-a...Interpretation (3-11-43) covers oil measures with flexible spouts.

L-54-a...Amended order makes provision for authorizing scheduled production of typewriters (3-12-43).

L-54-c...Amended order makes provision for authorizing scheduled production of office equipment (3-12-43).

L-83...Amended order clarifies restrictions on shipment of certain types of industrial equipment (3-12-43).

L-91...Amended order makes provision for authorizing scheduled production of commercial laundry equipment (3-12-43).

L-144...Interpretation (3-8-43) states that water utility companies may obtain laboratory equipment.

L-158...Amended order establishes methods of controlling production of automotive replacement parts (3-11-43).

L-264...Order places control over production, distribution and sale of rectifier tubes (3-10-43).

L-269...Order places mining equipment under strict control (3-11-43).

## New Ruling Eases Telegraphic Ordering

Washington

• • • Application of preference ratings to telephone and telegraphic orders for scarce materials is further simplified by amendments of Priorities Regulation No. 3, announced March 9 by WPB. In a telegraphic order, use of the phrase "ratings certified" replaces the ten-word form of certification previously required. The paragraph of Regulation 3 providing for oral application of preference ratings when orders are placed by telephone has been modified to require that only a written description of the materials purchased be sent by the buyer to the supplier, within 15 days following placement of the order.

A preference rating assigned in the

course of a telephone order may now be extended immediately by the supplier, if necessary to acquire the material to be delivered. It may not, however, be extended to replenish inventory until receipt of the written confirmation.

## WPB Appoints Several Industry Advisory Groups

• • • Formation of several industry advisory committees was announced this week by WPB. Members of the committee for the crane and hoist industry are:

S. Buckley, pres., Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.; J. M. Etienne, pres., Cyclops Iron Works, San Francisco; H. T. Florence, vice-pres. and general manager, Cleveland Crane & Engineering Co., Wickliffe, Ohio; Gerald Frink, pres., Washington Iron Works, Seattle; W. Harnischfeger, pres., Harnischfeger Corp., Milwaukee; Hoyt E. Hayes, pres., Industrial Brownhoist Corp.,

Bay City, Mich.; C. B. Veit, sales manager, Wright Mfg. Div., American Chain & Cable Co., Inc., York, Pa.; Stanley M. Hunter, American Hoist & Derrick Co., St. Paul, Minn.; R. B. Loudon, Loudon Machinery Co., Fairfield, Iowa; J. R. McGiffert, Clyde Iron Works, Inc., Duluth, Minn.; J. E. Minty, general manager, Manning, Maxwell & Moore, Inc., Muskegon, Mich.; W. W. Peattie, pres., Northern Engineering Works, Detroit; Edgar C. Rice, vice-pres., Whiting Corp., Harvey, Ill.

**Welded and weldless chain manufacturers industry advisory committee members named are:**

Frank A. Bond, vice-pres., McKay Co., Pittsburgh; George Campbell, pres., International Chain & Mfg. Co., York, Pa.; L. D. Cull, Cleveland Chain & Mfg. Co., Cleveland; F. G. Hodel, pres., Hodel Chain Co., Cleveland; J. S. Butler, production manager, American Chain Div., American Chain & Cable Co., Inc., York, Pa.; Edgar Littman, pres., Nixdorf-Krein Mfg. Co., St. Louis; Theodore Russell, pres., J. M. Russell Mfg. Co., Naugatuck, Conn.; Charles C. Swartz, treasurer, H & O Chain Co., Inc., South Norwalk, Conn.; E. M. Taylor, pres., S. G. Taylor Chain Co., Hammond, Ind.; A. L. McKinnon, vice-pres., Columbus McKinnon Chain Corp., Tonawanda, N. Y.

## L-269 Will Control Mining Equipment April 1

Washington

• • • The mining equipment industry was placed under control last Thursday by Order L-269 which will permit WPB to direct the scheduling by manufacturers of all their production and deliveries. Industry-wide scheduling will begin April 1 with the Mining Equipment Division administering the order.

By means of production and delivery schedules, control will be exercised over the fabrication and consumption of materials beyond the point where CMP allocations cease to govern their movement or use.

Beginning April 1, manufacturers of mining equipment will be required to operate in accordance with schedules submitted by them on Form PD-815, showing in detail their proposed production and deliveries. Form PD-815 must be filed by each manufacturer in triplicate on or before March 25, and again on the 15th day of each succeeding calendar month. Except as the schedules may be changed by WPB, PD-815 will determine precedence of manufacture and sequence of deliveries as among the various customers or claimants from whom rated orders have been received. Products which will be controlled under L-269 are enumerated in "List A" of the order.

## Testing Machines Limited

• • • Control over the production and distribution of certain precision measuring instruments and testing machines is tightened by General Preference Order E-9, issued last week. The order covers balancing machines, bench centers, comparators, gaging machines, etc., of \$200 or more.

Under the terms of E-9, acceptance of purchase orders is restricted to those assigned ratings of A-1-a or higher by certain specified preference rating certificates, copies of which must be supplied to the producers. When requested by the Director General, producers shall file notification of all unfilled orders and proposed delivery schedules on Form PD-669 and, when such notification is required, they shall also file data on Form PD-670 concerning shipments and changes in orders previously reported. Delivery schedules are frozen for 60 days prior to the scheduled delivery date unless otherwise directed by the Director General.

## WPB Makes Further Changes in Personnel

• • • George K. Batt, vice-president of Dugan Brothers, Newark, N. J., appointed an alternate industry member of WLB, replacing Harry L. Derby, president of American Cyanamid & Chemical Co., who resigned last month to return to his position in industry.

Walter D. Barry, Minneapolis-Moline Power Implement Co. executive, named chief of the newly organized Field Service Section of the WPB Farm Machinery Equipment Division.

William F. Kelly appointed chief of the parts, distribution, and transportation section of the Machinery Price Branch.

Clarence Eugene Searle, appointed as an executive consultant specializing on the production of pumps and compressors in the General Industrial Equipment Division, will devote part of his time to duties in Washington, continuing as vice-president of the Worthington Pump & Machinery Corp. in New York City.

John F. Fennelly made director of the WPB Program Bureau to replace Donald D. Davis. Mr. Fennelly will continue to serve as vice-chairman of the Requirements Committee and chairman of the Program Adjustment Committee, while Mr. Davis becomes WPB vice-chairman for operations.

Edwin H. Brown, Chief of the WPB Steel Division's Plant Facilities Branch, has resigned that position to return to his former position as vice-president of Allis-Chalmers Mfg. Co.

Prof. Thomas J. Kinsella, of Massachusetts State Teachers College, has been appointed price executive of the OPA Machinery Branch.

## Utility Connections Relaxed

Washington

• • • Advance approval of limited utility connections for construction or remodeling projects permitted under L-41 was granted in Supplemental Utilities Order U-1-d issued last week by WPB. To qualify for such automatic approval, material for an electric, gas, or water connection must cost less than \$1500 in case of underground connection or \$500 in the case of other construction.

## Machinery Set To Allocate Coke

Washington

• • • An order under which coke made from bituminous coal can be allocated, if such action should become necessary, was issued last week by WPB. The order, M-292, requires producers to file monthly production, distribution, and inventory reports with the Bureau of Mines on forms BE or BY of the Bureau. These forms have been filed voluntarily by producers for the past year.

Blast furnaces producing pig iron consume about 80 per cent of all coke produced in this country. The balance is consumed in the manufacture of water gas and producer gas, for domestic heating, for foundries, and for other industrial purposes.

The Office of Solid Fuels Coordinator reports that there is no shortage of bituminous coal at present. However, since coke production is limited by the total coke plant capacity, it is estimated that the coke supply will be slightly below requirements for both 1943 and 1944. It was therefore considered advisable to provide the means of allocation control established by the new order.

## Canada Restricts Metals in Equipment

Ottawa

• • • New orders-in-Council have been passed which place further restrictions on production in Canada of articles containing steel and other metals. Announcement also is made here that the Controller of Supplies relinquishes certain jurisdiction to the wartime Price and Trade Board. Included in materials that now come under regulation of Wartime Prices and Trade Board, and on which restrictions have been placed, are stoves, vacuum cleaners, washing machines, radios and parts, refrigerators, certain metal products, household electrical appliances, electric irons, etc.

Under the new order production is prohibited of radios and phonographs for civilian use, but exemptions permitted in the original order have been carried forward and permission for maintenances have been added.

The new order prohibits manufacture of metal furniture and metal furniture parts, sales of commercial laundry and dry cleaning equipment will be subject to permit in the future. Production of stoves and ranges will be based on a monthly permit.





## LET'S HELP UNCLE SAM

On this man power question, Uncle Sam needs your help . . . everybody's help!

He is faced continuously with the growing problem of greater production and a bigger Army and Navy.

The draft boards are handling the matter of men for our armed forces effectively. Where Uncle needs your help is in making more men and more women available for production. You can help by reviewing:

1. **ABSENTEEISM**—Get the percentage of absenteeism in your business today, compared to a few years ago. Review your personnel policies, hours of work and safety records.
2. **UTILIZATION**—Are you hoarding labor? Many war plants maintain at all times, an excess labor supply of from 10% to 25% . . . dangerous in peacetime and unpatriotic hoarding in wartime.

Are you planning and scheduling your work to conserve labor? Do you have sound material control? Do you practice preventive maintenance? A man who is waiting for a job, for tools, for materials, for a machine to be repaired, is not being utilized. This is lost man power, because more men are then needed to produce what one man could.

I am proud to say that every day our organization is helping our clients to better utilize their man power. Perhaps we can help you.

*Geo. P. Trundle Jr.*  
President

## THE TRUNDLE ENGINEERING COMPANY

*Consulting Management Engineering*

GENERAL OFFICES • CLEVELAND • BULKLEY BLDG.  
CHICAGO • City National Bank Bldg. • 208 S. La Salle Street  
NEW YORK • Graybar Building • 420 Lexington Avenue

## PRIORITIES

### Production Provided On Four Frozen Products

Washington

• • • Provision for authorizing scheduled production of four types of products, whose manufacture for all non-essential uses has been stopped, was made on Monday in four WPB orders. The products are: typewriters, domestic laundry equipment, commercial laundry equipment, and office equipment.

It was pointed out that production schedules for each of the type of products covered will be authorized only for meeting military and other requirements essential to the war production program. Monday's actions are not to be interpreted as a general relaxation of existing restrictions on production of the equipment specified; it was pointed out.

### Instrument Makers Get New Instructions

Washington

• • • Manufacturers of electrical measuring instruments whose production will be scheduled under Order M-293 will not be required to bring scheduling data to Washington, it was indicated at a recent meeting of the Electrical Instrument Advisory Committee. At the same time component producers were requested to place orders for fine wire, springs and magnets in anticipation of additional demand for measuring instruments.

It was decided by the committee that order boards should be adjusted to present requirements, both as to future orders and those already placed. Order adjustment is expected to expedite the filling of small orders and regulate the distribution of the measuring instruments.

### Petroleum Coke Use Eased

Washington

• • • Products in which the use of petroleum coke has been permitted may now be packed in that commodity during manufacture, under the terms of Order M-212 as amended by WPB last Saturday. Before being amended, Order M-212 permitted the use of petroleum coke for these essential purposes, but, except for electrical products, did not specifically permit the products to be packed in petroleum coke while baking.

## PRIORITIES

### New CMP-4B Issued For B Product Allotments

... A revision of Form CMP-4B has been issued by the Controlled Materials Division. This is to be used in making application for allotment of controlled materials for Class B products, which include common components. This new form also makes provision for applications to be filed quarterly for the next year, or up to July 1, 1944. As in the case of the revised Form CMP-4A, which was previously announced, the new form also is divided into two sections. The first calls for production schedules and the second calls for purchase schedules. This form also has a third section calling for a report of shipments analyzed by preference rating and claimant agency.

### Restrictions Tightened On Tinplate and Blackplate

... Restrictions have been tightened in the use of tinplate and blackplate in containers for paint, varnish and lacquer during 1943. The limitation this year will be 35 per cent of the area of plate used in such containers last year. It is expected therefore that the manufacturers will make greater use of one-gallon fibre containers with metal ends.

### Steel Pail Prices Set

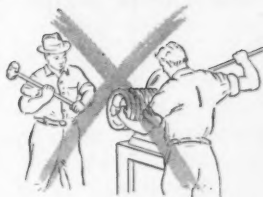
... Specific maximum prices for 5 1/2 gal. used steel pails and for used steel containers of 22 gage and lighter are established by the OPA to conserve shipping containers. The action is taken in Amendment No. 2 to Revised Price Schedule No. 43, as amended, effective March 18, 1943.

### Belt Drive Changes Seen Saving Crude Rubber

... A plan to save 250,000 lb. of crude rubber this year has been announced by Walter Geist, president of Allis-Chalmers Corp. and inventor of the multiple V-belt drive.

This program calls for the use of "wartime drives" using shorter center distances and larger sheaves on all new applications in 1943. Following this plan, Mr. Geist points out, would not only save rubber but would also save on the average of \$15 out of every \$100 spent on new drives and \$35 out of every \$100 ordinarily spent on replacements. Only slight changes in dimensions are necessary, he was said.

## A wrench will get it on or off in *Sixty Seconds*



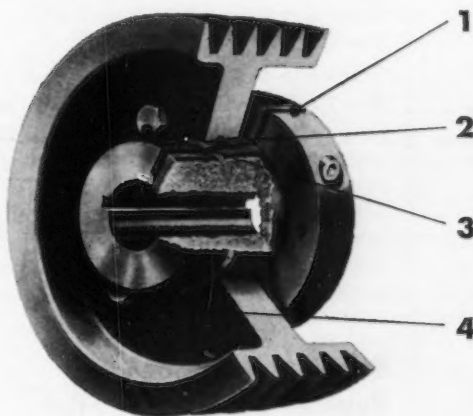
**GONE FOREVER**  
is the dangerous, time-wasting method of sledging a V-belt sheave off a shaft.



## IF IT'S A WORTHINGTON **QD** (QUICK DETACHABLE) SHEAVE

Twirl off the pull-up bolts with a socket wrench . . . Insert two of the bolts into the two tapped holes in the rim forcing the rim off the tapered hub.

The Worthington QD Sheave is "easy to get on, easy to get off . . . yet always tight on the shaft," a development that will help you conserve vital equipment, energy and time.



1 **SPLIT HUB** for easy mounting or removal from the shaft.

2 **TAPERED FIT** between split hub and rim for easy mounting or removal of rim from hub.

3 **PULL-UP BOLTS** which pull the rim onto tapered split hub for tapered friction drive assembly and positive press fit on the shaft.

4 **TAPPED HOLES IN RIM** for using pull-up bolts as jack screws to free the tapered friction fit when detaching the rim.

Investigate the advantages of the QD Sheave today. Arrange with the Worthington authorized Multi-V-Drive dealer in your area for a demonstration of the patented QD Sheave principle.

MV3-4

### WORTHINGTON

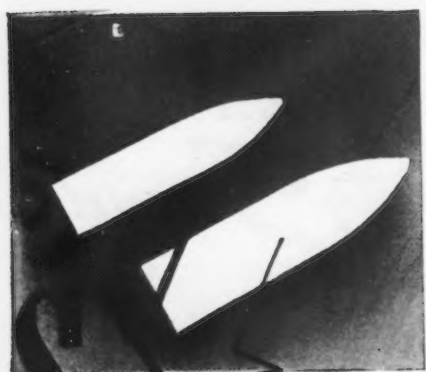
### MULTI-V-DRIVES

COMPLETE DRIVES

SHEAVES OR BELTS ONLY

WORTHINGTON PUMP & MACHINERY CORPORATION • GENERAL OFFICE: HARRISON, N. J.





**SUPERIOR'S**



**Sr. Veneer**

**CLAD METAL  
STRIP**

**IS MAKING A  
SOLID CONTRIBUTION**

**TO EVENTUAL**

**VICTORY"**

**•• AN IMMEDIATE**

**ASSISTANCE TO**

**CONSERVATION**

**AND OFFERS MANY  
NEW AND INTERESTING  
PEACE TIME APPLICATIONS**

**AFTER THE WAR IS**

**WON!**

**SUPERIOR  
STEEL CORPORATION  
CARNEGIE  
PENNSYLVANIA**

## NEWS OF INDUSTRY

### Absentee Problem Needs Approach from Cause Angle

Chicago

• • • Absenteeism must be approached from environmental causes, such as inadequate transportation, shopping and amusement facilities, if the problem is to be solved intelligently W. H. Spencer, WMC regional director, believes.

Most cures proposed for absenteeism strike at the effects, not the cause, and far too little is actually known of the true nature of the problem to permit use of the remedies now being discussed, he said at a War Production Clinic here last week. Spencer estimated that by Dec. 31 some 6,400,000 additional workers will be needed in industry and agriculture and at least 3,200,000 of these will have to come from present nonessential industries. This will be a painful process, he warned, for people cannot be moved around like materials.

### ODT Acts to Assist Vessel Movement on Lakes

Washington

• • • To allow free movement of coal and grain on the Great Lakes before the iron ore traffic reaches the peak of the 1943 season, ODT last Thursday temporarily suspended the requirement of ODT permits for movement of commercial vessels, and lifted until May 1 restrictions on coal movements.

Despite the fact the lakes won't be free of ice before April 1, ODT said that it is anticipating an over-all tonnage increase of as high as 7 per cent over the all-time record of 178,577,828 net tons of commercial bulk freight moved last season. However, the opening and closing dates of the navigation season will affect the total.

### February War Spending Reaches \$253-Million High

• • • The average daily rate of United States war expenditures reached a new high of \$253,400,000 in February. The previous high in November, 1942, was surpassed by 3.6 per cent, or \$8,900,000. Expenditures for war purposes totaled \$6,081,000,000 in February. This was \$173,000,000, or 2.8 per cent, less than in January and 2½ times expenditures a year ago February. The daily rate in February exceeded the January rate by \$12,900,000.

in all



hands



Laminum shims place quick precision in the hands of every assembly and maintenance man. (.003 or .002 in. brass laminations bonded together and easily peeled.) Cut to your specifications.

Stock shim materials obtainable from your mill supply distributors. (Write us for sample and illustrated application chart.)

**Laminated Shim Company  
Incorporated**

76 Union Street Glenbrook, Conn.

**it's  
LAMINUM**

THE SOLID SHIM THAT *peels* FOR ADJUSTMENT

## "Discrimination" Clarified for CMP Order Acceptance

Washington

• • • A controlled materials producer who has rejected a late order or small order from one customer is not under certain conditions prohibited from accepting such an order from another customer. This was made clear by WPB in Interpretation No. 1 to CMP Regulation No. 1. The producer may reject such an order from one customer while accepting it from another if the difference in treatment of the two orders is based in good faith on differences in the practicability of filling the orders. Practicability would be based on the nature of the material ordered, the condition of the production schedule at the time the orders are received, or similar factors.

The interpretation grew out of questions as to what constitutes discrimination between customers within the meaning of paragraphs (s) (4) and (t) (2) (i) of CMP Regulation No. 1. These provisions prohibit producers of controlled materials from discriminating between customers in rejecting or accepting orders which are filed later than the prescribed time or which call for deliveries of less than the mill quantities.

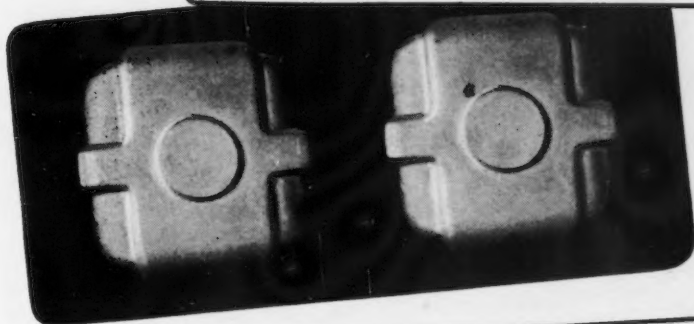
## Segregation Required Of Aluminum Scrap Dealers

Washington

• • • To obtain a better flow of aluminum plant scrap in usable form, WPB on Tuesday amended Order 4-1-d and required aluminum processors to segregate their scrap according to the terms of the order if they generate 500 lb. or more monthly. Previously the order applied to those plants generating 1000 lb. monthly. The order made other changes as follows: Shipment of segregated plant scrap to approved smelters or dealers provided the amount of any alloy shipment in a 30 day period does not exceed 10 tons. Previously the order required that shipments of any one alloy amounting to more than 2½ ton a month be sent to processors and not to smelters or dealers. Dealers have been made responsible for carrying out of segregation programs.

## The X-Ray Story of TWO CASTINGS!

From The **OUTSIDE**—  
—alike as two peas!



But what a Difference **INSIDE**—  
as shown on an X-Ray film!



**T**HESE pictures tell an amazing story. At the top are shown two castings both from the same mold—apparently identical and both acceptable upon a surface inspection.

However, X-ray inspection shows that one is free from defects and practically perfect, but the other shows gas pockets which should mean immediate rejection! Thus, X-ray inspection saves costly machining as well as the possibility of an expensive break-down in use.

KELEKET Industrial Units are now being used by many industrial plants for making X-ray inspection radiographs—both in the laboratory and in the production line. Harnessed to war production, these units save time and money—and improve quality!

There is a KELEKET X-ray machine for every industrial use, from the inspection of the lightest aluminum sheets up to 5-inch steel, and these machines will detect flaws as small as 1% of material thickness.

Consult KELEKET engineers for information concerning X-ray inspection for your requirements.

**THE KELLEY-KOETT MFG. CO., INDUSTRIAL DIVISION,**  
230-3 West Fourth Street, Covington, Ky.  
Representatives in 64 Cities



PIONEER CREATORS OF QUALITY X-RAY EQUIPMENT SINCE 1900





**EFFICIENT POSITIONING**  
means better welding  
and greater output...

» Write for literature and full details  
on Ransome Welding Positioners

Two of more than 90 Ransome  
Welding Positioners in this plant

**Ransome WELDING POSITIONERS**

INDUSTRIAL DIVISION • RANSOME MACHINERY COMPANY • DUNELLEN, NEW JERSEY

**How many  
WORDS  
in a speech?**

Usually too many, we think. We're not very long on words here at Dunbar's. Springmaking is our business and we prefer to stick to it. We'd rather show you how your spring may be improved, perhaps at lower cost—or possibly at savings in assembly time. We like to work on new spring developments, too. It's sort of a hobby with us.



*Good spring action speaks louder than words!*

**DUNBAR SPRINGMAKERS**  
SPRINGS WIRE FORMS SMALL STAMPINGS

**DUNBAR BROS. CO., Bristol, Conn.**  
Division of Associated Spring Corporation

## Emergency Needs Met By Local Redistribution

Philadelphia

• • • The Philadelphia regional office of the WPB Material Redistribution Branch has listed in its inventory files more than 250,000,000 lb. of idle and excess materials, exclusive of thousands of listings of machinery and equipment, according to Richard P. Hendren, deputy regional director. These files include records from surveys made under the government's several materials recovery programs, supplemented by the division's own miscellaneous inventory records and by its own special surveys.

Although concerned primarily with emergency needs in eastern Pennsylvania, southern New Jersey, Delaware, Maryland, and Virginia, the Philadelphia office has located materials and filled requests from as far away as Tulsa, Okla.

Among the emergency requests recently met by the office were ones for 500 razors for a Naval vessel, 1000 ft. of 90-lb. steel rail for a Camden shipyard, iron work for three forges, 8600 lb. of 1½-in. steel bars for a Virginia food equipment maker, 10,000 lb. of ¾-in. brass rod for bomb parts, and 300 lb. of nickel sheets for chemical apparatus.

## Canadian Firm Makes Record Cast Steel Chain

Montreal

• • • Sorel Steel Foundries, Ltd., Sorel, Que., has completed the largest cast steel chain ever manufactured in Canada. The order for the marine railway chain was placed by a Canadian shipbuilding firm.

The chain is used as the restraining medium in lowering the platform with the 10,000-ton hull. The job requires 1¼ miles of 2¼-in. chain, each link weighing 38 lb. and cast into 90 ft. lengths. Production problems in manufacture included proper testing of the chain to insure that each length would meet the drag it would be subjected to when letting the hull and launching platform down the inclined railway. The solution was achieved by having eight lugs welded around a 180-ton scow. Hawasers were run from each lug to the center of the scow and attached in turn to each 90 ft. of chain, the other end of which was hooked to a shear leg.

## Andrews Steel Co. Is Bought by Group

New York

Lehman Bros., New York investment brokers, announced Tuesday that Andrews Steel Co., Newport, Ky., had been sold to a group consisting of Lehman Bros. and associates, including Norman B. Schreiber, elected president. It was said the stock had been purchased for investment and would not be put on the market.

It is understood Mr. Schreiber is president of McDonald Bros., Chicago, engineering firm.

Andrews Steel Co. was incorporated in 1907 and reincorporated in 1922. In recent years it has been headed by A. K. Andrews, president. The company produced carbon and alloy steel ingots (capacity 321,000 tons per year); forging and rerolling billets, slabs and sheet bars. The works at Newport included seven open hearths; a blooming mill and two sheet bar mills.

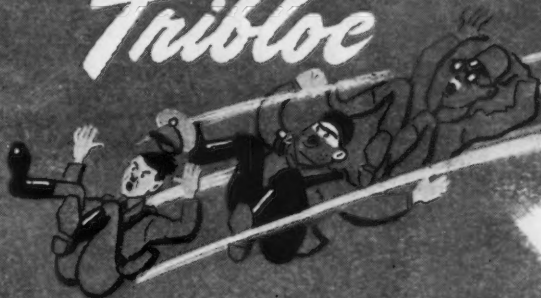
Newport Rolling Mill Co. is a subsidiary of Andrews and produces hot and cold rolled sheets, enameling stock, electrical, galvanized and long terme sheets. Capacity for hot rolled and hot rolled annealed sheets is about 180,000 tons per year, and cold rolled sheets about 100,000 tons per annum.

For weeks the sale of Andrews had been rumored and various steel companies had been reported linked with the purchase.

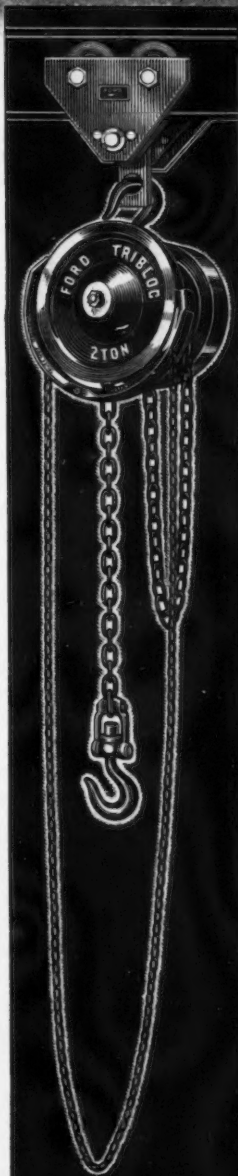
In 1885, two brothers, Joseph A. Andrews and Albert L. Andrews began business under the name of the Globe Iron Roofing & Corrugating Co. to which was added in 1890 the Newport Rolling Mill Co. The Andrews Steel Co. was built in 1908 to round out a complete producing steel plant. The three corporations were merged Jan. 1, 1933.

The second and third generations of the Andrews family has had the management responsibilities of the corporation for the past 20 years. The board of directors of the new company includes Frederick L. Schuster, I. J. Harvey, Jr., president of the Flintcote Co.; William K. Jacobs, Jr., N. Y.; Mr. Schreiber, and H. W. Boal, vice-president and treasurer of Andrews Steel. Vice-president in charge of production and sales is Charles H. Stamm.

# Grease your Ford Tribloc



## ... AND YOU GREASE THE SKIDS FOR THE AXIS



FORD TRIBLOCS withstand abuse amazingly well—but this is certainly no time to abuse anything made of critical materials. Like any other precision-made machine, FORD HOISTS will give more efficient service for a longer time if properly maintained. In FORD HOIST maintenance, lubrication is perhaps the most important single factor—so here are a few pointers on lubricating FORD TRIBLOCS.

- The gear cover should be removed occasionally and a small quantity of suitable graphite grease applied.
- The load chain should be lubricated frequently with a heavy oil, particularly at engaging points of links.
- Load sheaves should also be greased.
- Oil the bearings frequently so that no bearing will run dry and cause excessive wear.
- Oil holes are provided in the TRIBLOC at vital points. These should be used frequently.

When given intelligent care, lubricated thoroughly at intervals, FORD TRIBLOCS will remain efficient under the hardest usage for a long time. Your FORD HOIST can be one of your best friends during this production emergency. Take care of it.

### FORD CHAIN BLOCK DIVISION

PHILADELPHIA • CHICAGO  
SAN FRANCISCO



AMERICAN CHAIN & CABLE COMPANY, Inc.  
BRIDGEPORT, CONNECTICUT



# PERSONALS

• **Leland M. Hogan** has been appointed eastern district manager of the American Welding & Mfg. Co., Warren, Ohio, with headquarters in New York. **F. L. Schneider** has been named Chicago district manager, and **Carl I. Laraway** has been named as comptroller of operations. **Frank J. Shanaberg** will be manager of the product development department.

• **Norman C. Einwechter**, who has been a special representative for the Carpenter Steel Co., Reading, Pa., has been appointed assistant to the vice-president, with offices located in New York and Philadelphia.

• **W. E. Zimmerman**, formerly purchasing agent, has been named general manager of the Greer Steel Co., Dover, Ohio, and **H. R. Walter** has been appointed treasurer, following the death of **H. C. Cappel**, treasurer and general manager. Mr. Walter heretofore was the company's assistant treasurer.

• **S. B. Taylor**, works manager of the Reliance Electric & Engineering Co., Cleveland, since 1931, has been elected manufacturing vice-president. Mr. Taylor was transferred from the engineering to the manufacturing department of the company in 1930 and became works manager a year later. He was elected a director of the company in 1935.



**S. B. TAYLOR**, manufacturing vice-president, Reliance Electric & Engineering Co., Cleveland.



**W. G. REICHERT**, who has resigned as chief foundry metallurgist of the American Brake Shoe & Foundry Co. to organize the W. G. Reichert Engineering Co., Newark, N. J.

• **John B. Hill** has been promoted from assistant to superintendent of blast furnaces at the Lackawanna, N. Y., plant of Bethlehem Steel Corp. in succession to **Benjamin J. Harlan**, who recently resigned to join the Lone Star Steel Co., Daingerfield, Texas. Mr. Hill has been with Bethlehem for 22 years and was foreman at the Johnstown, Pa., plant before going to Lackawanna.

• **Robert A. Bell**, formerly with the Superior Steel Corp., Carnegie, Pa., has been appointed manager of sales of Darwin & Milner, Inc., Cleveland, tool steel specialists who were the first to introduce high carbon, high chrome steels.

• **C. C. Lewis** has been named plant manager of Schick, Inc., Stamford, Conn. Mr. Lewis was formerly connected with Bendix-Westinghouse Automotive Airbrake Co.

• **Horace A. Deane** has been appointed works manager of the brake shoe and castings division of the American Brake Shoe & Foundry Co., to succeed **W. Scott Fraula**, who was recently appointed operating assistant to the president.

• **William E. Simons**, recently appointed regional director of general salvage at Chicago for the WPB, has returned to Milwaukee to become deputy regional director of WPB for eight northern division district offices. He succeeds **Rex Reeder**, executive vice-president of the Marine National Exchange bank.

• **Joel Claster**, Luria Brothers & Co., Inc., Philadelphia, has been appointed chairman of the brokers' committee of the Institute of Scrap Iron and Steel Inc. **Walter Erman**, of Erman-Howell & Co., Inc., Chicago, has been made vice-chairman. Other members are: **Herman D. Moskowitz**, of Schiavone-Bonomo Corp., Jersey City, N. J.; **Myer W. Singer**, of M. W. Singer & Co., Pittsburgh; **William Rosenthal**, of Hyman-Michaels Co., St. Louis, and **Louis Z. Zalk**, of Duluth Iron & Metal Co., Duluth, Minn.

• **Armin G. Kessler**, vice-president and general manager of the Buffalo plant of Farrel-Birmingham Co., Inc., for the last 24 years, has been transferred to the main office at Ansonia, Conn., as general works manager. He will direct all manufacturing operations in Ansonia, Derby and Buffalo. **L. D. Chirgwin**, assistant general manager, has been promoted to general manager in Buffalo. The two promotions follow the resignation of **N. W. Pickering**, company president, to enter Naval service.

• **Edward C. Myers**, assistant director of public relations, Pittsburgh District, has joined the staff of the director of industrial relations, United States Steel Corp. of Delaware, as senior staff assistant in charge of personnel. **Eric Ferguson** of Carnegie-Illinois Steel Corp., Pittsburgh, has been transferred to the staff of the director of public relations, United States Steel Corp. subsidiaries, Pittsburgh district.



**E. C. MYERS**, senior staff assistant in charge of personnel, United States Steel Corp.

• **F. Carl Hirdler, Jr.**, chemist and processing engineer, has recently joined the Los Angeles laboratory staff of Turco Products, Inc. Mr. Hirdler will conduct the Turco School in Aircraft Materials and Processes.

• **Francis J. Linsenmeyer**, director of mechanical engineering at the University of Detroit, has resigned to become factory manager and chief engineer of the National Stamping Co.

• **Harold N. Evans** has been named New York district sales manager of Century Steel Products Co., to replace E. W. Fiedler, who is now connected with the Century steel corporation at its main office in Chicago.

• **J. J. Jordan** has been appointed director of customer relations of True Alloys, Inc., Detroit. He was formerly with the sales division of Federal Mogul Corp.

• **W. A. Cleneay**, who has been working with the engineering staff at the new Texas City, Tex., plant of the Monsanto Chemical Co., St. Louis, has been transferred to St. Louis to head coordination of Monsanto's activities relative to camouflage, blackouts and air raids. **Edwin R. Campbell**, who also has been working at the Texas City plant, has been transferred to St. Louis to head the salvage and surplus equipment section of the general engineering department. **Milton Welhoelter**, mechanical engineer at the Nitro, W. Va., plant, has been transferred to the process engineering division of general engineering and is assigned to the Texas City plant to make a special study of certain phases of this operation. **Ogden Fitz Simons**, who just recently joined Monsanto, has been assigned to the process engineering division of the General Engineering department and **Lester Herring**, who has been working in the salvage department at St. Louis, has been transferred to the operating organization at Texas City where he will act as technical assistant to the operating engineer in charge of the power plant.

• **H. M. Rowlette**, newly elected vice-president and general manager, will be in active charge of Whiting Corp. (Canada) Ltd., Toronto. He succeeds **Col. James Mess**, now devoting full time to government duties at Ottawa. Mr. Rowlette has been with the parent company at Harvey, Ill., since 1912 and for many years was in charge of purchases and stores. Serving with him as assistant general manager is **Alex Ritchie**.

• **F. M. Beaudoin** has been appointed employment manager of United States Steel Supply Co.; **John M. Kennedy**, assistant supervisor of priorities, has been made salary analyst. Mr. Beaudoin was first employed by this company in April, 1942, as a wage and salary administrator.

• **Tulio Cordero**, formerly connected with the United Drug Co. in Boston, has been added to the research laboratory staff of Quaker Chemical Product Corp., Conshohocken, Pa., as has **Dr. Boris Schwartz**. **D. W. Prichard**, formerly associated with W. H. & L. D. Betz, of Philadelphia, has joined Quaker's technical sales division.

• **Alvin A. Borgading**, who was appointed purchasing agent of American Car & Foundry Co. last December, has now been appointed general purchasing agent for that company. **George W. Brown**, who has been assistant purchasing agent since 1939, has been made purchasing agent and **Herbert Streader**, assistant purchasing agent, has been named assistant general purchasing agent.

• **Gene P. Robers** has been named advertising manager of the Weatherhead Co., to succeed **Robert H. Weatherhead** who has left the company to join the armed services. Mr. Roberts was formerly advertising manager of the Atlas Car & Mfg. Co., Cleveland, and previous to that he was the owner of his own industrial advertising agency.

• **Perry J. Rieppel**, welding engineer, has been named to the research staff of the Battelle Memorial Institute, Columbus, Ohio, where he will assist in welding research on industrial and governmental projects. Prior to joining the Battelle staff, Mr. Rieppel was associated with the Buffalo plant of the Curtiss-Wright Corp.

• **Frederick Salditt**, vice-president of the Harnischfeger Corp., Milwaukee, has been elected to the board of directors to succeed the late **Joseph Harnischfeger**. **H. H. Erkelenz**, executive engineer and coordinator, and **H. O. Menck**, works manager, have been elected vice-presidents of the firm. **William F. Heilman**, formerly assistant secretary, has been named secretary of Harnischfeger, and **Fred J. Hartmann**, assistant treasurer, also has been made assistant secretary.

• **Frank J. Phillips**, for many years associated with the Boston office of the Concrete Steel Co., has joined the American Steel & Wire Co., Boston.

## OBITUARY...

• **John E. Frederick**, chairman of the board of directors, director and member of the executive committee of the Continental Steel Corp., Kokomo, Ind., died March 3, aged 77 years. Mr. Frederick was one of the founders of the Kokomo Fence Machine Co. in 1896. He with two associates perfected and sold a small portable hand machine to be used by farmers in the weaving of wire fencing to replace the old zigzag rail fences which were used at that time. In 1901 he organized and was general manager of the Kokomo Steel & Wire Co., which was essentially a rod and fence mill, but later open hearth furnaces were added. In 1927 the Continental Steel Corp. was formed which included among other companies Kokomo Steel & Wire. Mr. Frederick, at that time, became chairman of the board, director and member of the executive committee of the newly formed corporation.

• **Charles T. Main**, past president of the American Society of Mechanical Engineers, died March 6. He was 87 years old. During the first World War he was consulting engineer for the construction division of the U. S. Army and was sent to France as a member of the American Engineering Delegation to assist the French in rehabilitation.

• **Henry A. Rousseau**, for 22 years traffic manager of Graton & Knight Co., Worcester, Mass., died March 6. He resigned from Graton & Knight Co. four years ago and for the past two years he had been with the Wright Machine Co.

• **J. P. Morgan** who in addition to all his other activities was the senior director of the United States Steel Corp., having been elected to the board of directors in 1909, died March 13. He served as chairman of the board of directors for five years following the death of Judge Elbert H. Gary in 1927. For nearly 35 years he had been a regular attendant at meetings of the board of directors and finance committee.

• **Harold B. Campbell**, a co-founder of the Colonial Can Co., Boston, died March 3, aged 68 years. He retired from business two years ago.



# MACHINE TOOLS

... Sales, Inquiries and Market News

## Manpower Shortages Threaten Machine Tool Output

Cleveland

• • • Acute manpower shortages seriously threaten maximum machine tool production in the Cleveland area, and unless some official relief in given machine tool builders, output of these highly essential products will be drastically curtailed.

In discussing losses of personnel, one firm reported that the current rate of losses of skilled help to the armed services through the draft runs about 100 per month over the hiring rate. At this high rate, it is only a question of a few months until production will be substantially curtailed. Another large producer in the district stated that for every person hired, three are lost to the armed services, and the increased loss of key personnel is quite critical.

In one department alone, every experienced man that was employed has been lost, and the department now is made up entirely of women. This particular department is charged with the responsibility of handling the shipping and maintaining inventories of the cutters and other small tools used in the company's line of machine tools. While normally women should be satisfactory for this type of work, the trained help was lost so quickly that women could not be trained fast enough to take over the work with any high degree of efficiency. The factory manager at this plant quite candidly admitted that he did not know at present what was in stock, what shipments were being made, and how close to schedule such shipments were.

There is hardly a machine tool builder in the district that would not willingly hire women and train them to take over the jobs of men drawn off by the draft, but the women labor market in this area is highly competitive. There are not nearly enough women to meet the demands of a mixed industry city such as Cleveland. In trying to hire women, machine tool builders have to bid for their help against manufacturers who can afford to pay much higher starting wages. The same is quite true of attempting to hire negro men.

The largest untrapped labor supply in the northern Ohio area is colored women, and several companies have

contemplated drawing upon this pool. For the most part, this supply of help will come from the comparatively poorly educated, and more time will probably be spent in training these women than would be required in training white women. Since almost all of the machine tool plants are organized under AF of L or CIO, there is also union attitude toward the hiring of negro women to be considered, and at present in one instance at least, this attitude has been unfavorable. Finally, while there have been no official surveys on the subject made in this area, it is believed that absenteeism among negro workers is considerably higher than among white workers, and this will be reflected also if negro women are used to any great extent.

One machine tool builder in this district has already disbanded the use of three-shift operation, and at least one other is contemplating such a move within the next few weeks. The builder that dropped three-shift operation now works two 10-hr. shifts a day. This enables greater production with fewer employees.

On the whole, the use of women in machine tool plants has been highly satisfactory on work for which they are adapted. However, when a machine tool builder takes from two to six years to train a man to be competent on a given operation, it is difficult to bring new employees, women or men, into the plant and get them into production within a matter of weeks. Despite efforts by the Federal Government and various war agencies to put across the idea that long periods of time are not necessary to train help to meet the losses of men going into the armed services, production in practically every machine tool plant suffers as the drain on its old and experienced help increases in spite of training programs and choice hiring, when that was possible.

Manning tables for the replacement of help drawn off by the draft apparently are confusing in many instances, and really not doing much at present to help the situation. This seems to be because of the lack of uniformity in handling by the state boards. One company submitted a manning table plan recently, only to have it come back with a great number of suggested revisions. These re-

visions were made and it was re-submitted, but when it came back the second time, there were more revisions than originally. This all took place within a matter of two months.

Machine tool builders do not have the answer to this manpower question. They are fumbling along doing as best they can to make up the deficits in their personnel lists caused by the draft, but now the drafting of highly essential help and key personnel is increasing to such an extent that managers of these plants are baffled as to what to do. They are approaching the point where they are cutting operations down to a scale that they can man efficiently, and this bodes ill for production when statistics are tallied.

## Absenteeism a Problem

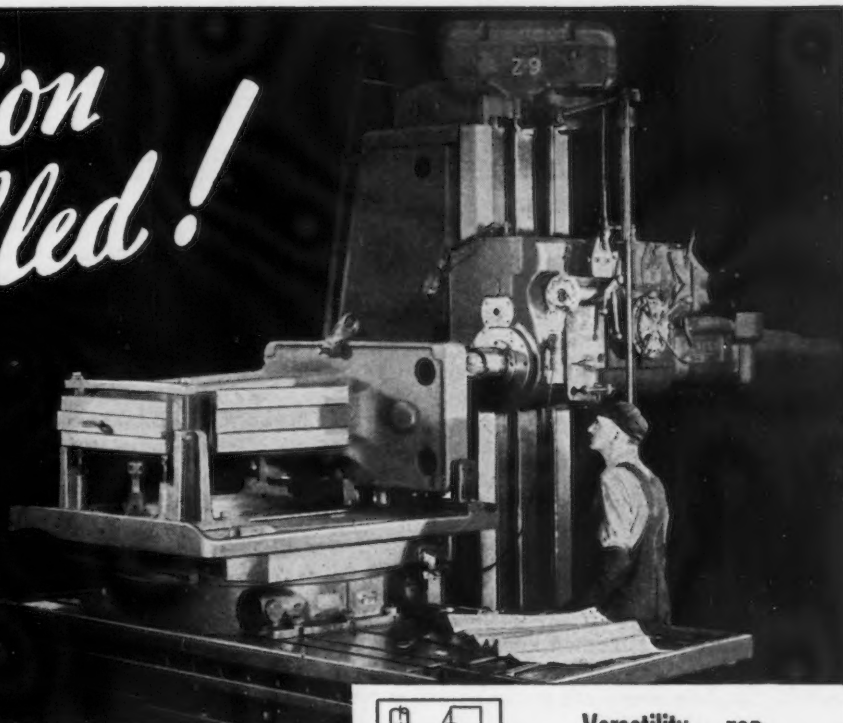
Cincinnati

• • • While absenteeism is an outstanding problem in the machine tool industry in this area, the general feeling is that absenteeism is no greater than in any other area with the strong probability that this area is in better position than most places. Personnel departments have been very careful in granting layoffs where permission is sought and at the same time, bonus and the premium plans generally have been keyed to the amount of time actually put in by an employee, with the idea of reducing absenteeism to a minimum. The opinion is expressed in some sources that the greatest offenders are among the younger and newest employees, the older and more experienced men showing greater disposition to stick to the job and take time off only because of absolute necessity. Of course, with the draft constantly cutting shop forces, employment of new and untrained persons brings absenteeism more to the forefront. Expansion of forces by the employment of women is still very slow, although a number of plants indicate satisfactory results from female workers in shops.

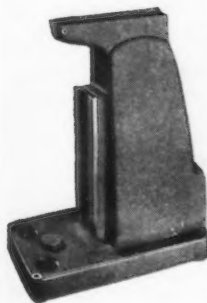
In the realm of new business, the overall picture indicates that new business, while at a slow pace, is still greater than cancellations. Adding present orders to backlogs already on the books, full capacity for the remainder of this year seems assured with a reasonable amount probably running over into 1944.

# Production Doubled!

**15-HOUR JOB  
REDUCED  
TO 7½ HOURS**



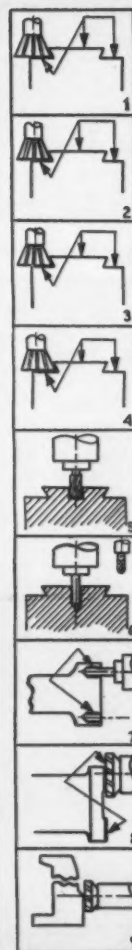
## 9 Operations Performed Include Rough and Finish Milling, Drilling and Tapping



It formerly took 15 hours to machine this machine-tool column. With this Giddings & Lewis Table Type Boring, Drilling and Milling Machine, the machining time has been reduced to 7½ hours.

In addition to increasing production and speeding delivery, accuracy has been improved. The columns were formerly machined on a traveling column machine with a fixed table. Both rough and finish milling cuts were completed on one side before resetting the column, thereby setting up strains and disturbing accuracy by not allowing the casting to cool.

This new G&L with the G&L rotary indexing table makes it possible to machine the entire casting in one setting. Operations can be performed in sequence best suited to obtain accuracy and production.



### Versatility ...FOR PROPER MACHINING SEQUENCE

The proper sequence of operations performed on the column are shown below. Feeds and speeds used: Nine spindle speeds, from 23 to 183 r.p.m., nine table feeds from 1.9" to 16" per minute—one spindle feed, .019" per minute for drilling and tapping.

**OPERATION 1**—Rough dovetail way on top of column—7½" wide x 25" long. Index 90° for milling side.

**OPERATION 2**—Rough dovetail way on side of column—29" long. Index 90° for milling top.

**OPERATION 3**—Finish dovetail way on top of column—29" long. Index 90° for milling side.

**OPERATION 4**—Finish dovetail way on side of column—29" long. Index 90° for milling top.

**OPERATION 5**—Mill gear rack slot on top—15¼" long x .496" ± .001" deep.

**OPERATION 6**—Drill and tap eye bolt hole—¾" drill, 7/8"—9NC Tap. Index 180° to drill bottom.

**OPERATION 7**—Drill 4 holes in bottom for hold down.

**OPERATION 8**—Mill pads on base. Index 90° for milling back side.

**OPERATION 9**—Mill surface for pump and coolant tank door.

## GIDDINGS & LEWIS MACHINE TOOL CO.

136 DOTY ST., FOND DU LAC, WISCONSIN

*Free Data*

Information covering the complete line of G & L machines and time-saving attachments and accessories is included in this catalog. Write for your copy. Ask for Catalog No. 33.





# NON-FERROUS METALS

... Market Activities and Price Trends

## Lead-Base Bearing Tests Show Possible Saving in Tin

• • • Savings of more than 99 per cent in the tin content of bearing babbitt, and the possibility of completely eliminating costly anchoring methods were two of the outstanding advantages recently disclosed in tests being made at the Cooper-Bessemer Corp., Mt. Vernon, Ohio, and Grove City, Pa.

According to research and development engineers of this diesel and gas engine manufacturer, a comparatively new metal cleaning method known as the "Kolene" process was credited largely for their success in being able to use and satisfactorily anchor lead-base bearing babbitt.

The Kolene process is said to provide an exceptionally firm and uniform bond between lead-base babbitt alloy and the Meehanite metal from which Cooper-Bessemer bearing shells are cast.

The bearing shells are first dipped into a hot molten salt bath to remove the carbon (graphite) particles common in cast iron. By cleaning out these particles in the metal, a con-

siderable amount of anchoring surface is added for bonding the babbitt.

After rinsing, the backings are placed in another salt bath to reduce surface oxidation resulting from the first bath.

The backings are again rinsed and suspended for a few seconds in cold HCl before they are dipped in a flux and placed in a low tin-constant alloy which forms a uniform coating on the bearing surface.

The bearing backings, so coated, are placed in proper jigs, and babbitt is poured against them, which readily forms the tight bond necessary to stand the pressure and stresses of big-engine operation.

The bonding is said to be so uniform and firm that bearing thickness has been reduced to a small fraction of the bearing thickness formerly required. This thin bearing alloy has stood up remarkably well under the most severe testing conditions.

## Copper Scrap Prices Revised

• • • In order to stimulate the flow of copper and copper alloy scrap to industrial consumers and to simplify administration and enforcement of

maximum price regulation No. 20, specifications and cents-per-pound prices for 16 new grades of such scrap were set by OPA, effective March 22. Several other changes were made in issuing the new regulation, including modification of the definition of copper alloy scrap to exclude copper-bearing material from price control. The new revision permits a quantity premium of 0.75c. a lb. for a shipment of 60,000 lb. of one group number as heretofore, but adds a quantity premium of 0.50c. a lb. for a minimum of 20,000 lb. of one other group number when shipped together in one care.

The new grades established today are:

Group No.	Grade	Maximum Prices f.o.b. Point of Shipment (c. a lb.)	
1	Copper borings	9.75	
1	Copper tuyeres	8.75	
2	Tinny bronze borings	10.50	
2	Copper-nickel solids and borings	9.25	
2	Aluminum bronze solids	9.00	
2	Contaminated gilding metal turnings	8.50	
2	Mixed brass screens	7.75	
2	Old nickel silver solids	6.25	
2	Old nickel silver borings	6.25	
2	Copper-lead solids	6.25	
2	Copper-lead borings	6.25	
3	Ziney bronze borings	8.00	
2	High grade-low lead bronze borings	(1)	
2	Soft red brass borings	(1)	
3	Manganese bronze solids	(1)	
3	Manganese bronze borings	(1)	

(1) Varies with analysis.

## Canadian Output Expands

Ottawa

• • • Canada has been steadily expanding production of strategic metals and on a number of important materials has reached the stage where output is sufficient for domestic war requirements and large quantities are being supplied to the United States and other Allied Nations, it was announced through the Metals Controllers offices here. The increased output has been chiefly due to greater production by the old established companies which have stepped up at the expense of ore reserves, while receiving only pre-war prices for their metal. In other instances operations have been assisted through the granting of capital assistance or price increase for metals by the Canadian and United States Governments. International Nickel Co. of Canada, Ltd.,

**KOLENE CLEANING:** Installation for handling the Kolene metal cleaning process at the Mount Vernon, Ohio, works of the Cooper-Bessemer Corp. The vats were especially made by Cooper-Bessemer workers and positioned for production handling of each progressive step in the procedure.



## ◆ - NON-FERROUS METALS - ◆

Noranda Mines, Ltd., Hudson Bay Mining & Smelting Co., Ltd., and a number of other established copper producers receive only slightly more than 10c. a lb. for copper under contracts made in 1939, while as much as 17c. a lb. U. S. funds, has been paid to certain government-assisted projects in Canada through arrangements made by the Metals Reserve Co. of the United States.

Also lead and zinc in excess of amounts covered by Empire agreements have jumped sharply in value; tungsten and many other minerals have benefited by special arrangements. To the present, agreements with potential and current producers have been implemented largely by individual contracts, a situation which prevails, and as the prices paid are governed by circumstances such as smelter charges, freight rates, costs, etc., quotations have not been published, except for a few metals. The Canadian Metals Controller's office has released prices on the following materials:

**COPPER**—The U. S. ceiling price is 12c. a lb., but bonuses have been paid up to 5c. a lb. and in rare cases up to 7.75c. As a result, prices for government assisted projects in Canada have been paid up to 17c. a lb. U. S., by arrangement with the purchaser, Metals Reserve Co.

**LEAD**—The base price is 6.5c. a lb., New York. Prices to the producer depend on smelting charges, freight, etc., effective in each individual contract.

**ZINC**—Metals Reserve is paying under bonusing arrangement, up to 8.75c. a lb. (U. S.) for zinc in concentrates less treatment charges and freight.

**SILVER**—In cobalt ores, it is paid for at current U. S. rate, which has lately been running approximately 48.225c. an oz., Canadian. Ceiling price as of Jan. 28, 1943, 40c. an oz. for small lots and 39.20c. for large lots, to purchasers.

**TIN**—Price for 99.8 per cent is 63.5 to 67c. a lb.

**TUNGSTEN**—Sheelite ores and concentrates containing 70 per cent WO<sub>3</sub> and otherwise meeting specifications of Metals Reserve Co., \$26.50 Canadian currency per unit, f.o.b. Welland.

### Non-Ferrous Prices

(Cents per lb.)

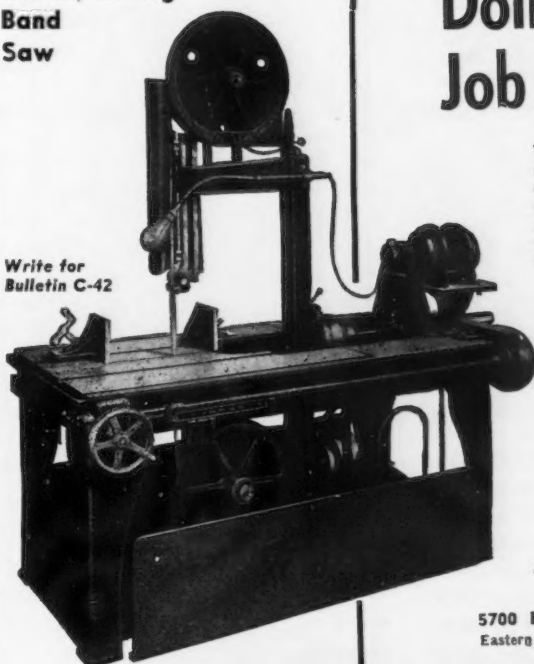
Copper Electrolytic, Conn. Valley.....	12.00
Copper Electrolytic, New York.....	11.75
Copper, Lake.....	12.00
Tin, Straits, New York.....	52.00
Zinc, East St. Louis.....	8.25
Zinc, New York.....	8.67
Lead, St. Louis.....	6.35
Lead, New York.....	6.50
Aluminum, Virgin 99+%, delivered....	15.00
Nickel, Electrolytic, base refinery.....	35.00
Magnesium, 99.8% ingot, per lb. ....	22.50

### Miscellaneous Non-Ferrous Prices

ALUMINUM, No. 12 remelt, 14.50c.; No. 2, standard, 14.50c. a lb. ANTIMONY, Asiatic, New York, nominal; American, 14.50c. a lb., f.o.b. smelter. QUICKSILVER, \$197 to \$199 per 76 lb. flask, f.o.b. shipping point. BRASS INGOTS, commercial \$5-5-5-5, 12.25c. a lb.

### Marvel No. 8 Metal-Cutting Band Saw

Write for  
Bulletin C-42



## Doing its War Job Well!

The busiest tool in the tool rooms, an essential tool in the complete die shop and a time and money saver in the maintenance department, because "it does all things well." The MARVEL No. 8 Metal Cutting Band Saw (capacity 18" x 18") will snip off an 1/8" drill rod, rough out the largest billet or cut a perfect 45° mortise on the end of a large I-beam without any special setting-up. Its large planer type bed takes all work. Its continuous blade feeds into the work at any angle from 45° right to 45° left. It has a large removable vise and a combination hand and/or power feed.

**ARMSTRONG-BLUM MFG. CO.**  
"The Hack Saw People"

5700 Bloomingdale Ave., Chicago, U.S.A.  
Eastern Sales Office: 225 Lafayette St., New York

# MARVEL SAWS

**MUSIC WIRE.** Conforming to Government specifications (WD 1085—WD 1095). Stock sizes .004" to .180" dia.

All JOHNSON wire is laboratory controlled all the way from original steel to finished product.

**JOHNSON STEEL & WIRE CO., INC.**  
WORCESTER \* MASSACHUSETTS.  
NEW YORK      AKRON      LOS ANGELES



# SCRAP

... Market Activities and Quotation Trends

## Scrap Easy Except For Labor Shortage; Confiscation Used

••• The scrap supply situation on a nationwide scale appears comfortable this week with the exception of spots where labor shortages are hampering operations. Most serious centers on this score appear to be Chicago, Buffalo, St. Louis and Detroit. The kick of most operators is that war plant wages cannot be equaled and consequently workers cannot be held. In spite of appeals for aid to both WLB and, it is understood, OPA, no decisions have been rendered which would help operators meet the wage demands.

Despite cranky criticism of OPA ceilings, a vote of thanks can be extended by operators who might otherwise be faced with falling prices in the present rather full market in some

sections. Likewise, the consumers know that they benefited by ceiling protection when scrap was scarce.

In what is believed to be the first use of confiscation, the WPB last week was reported to have seized scrap processing machinery of the A. B. Alpirn Co. of Omaha, Neb., after having repeatedly asked the firm to put it to some use. The seizure also is reported to have netted 125 tons of iron and steel scrap and 4000 lb. of non-ferrous materials.

## Two More Slag Dumps Worked

••• The slag dump accumulation at the Steubenville works of Wheeling Steel Co., and the dump of the Hamilton Foundry & Machine Co., Hamilton, Ohio, are being reworked by V. P. Serodino & Co., Cincinnati. Results from both these dumps are said to be good.

## Old Vulcanite Cement Plant To Yield 14,000 Tons of Scrap

••• An estimated 14,000 tons of idle industrial equipment and metal scrap will be recovered in the dismantling of the Vulcanite Portland Cement Co. plant at Alpha, near Phillipsburg, N. J., announced last week by the Philadelphia regional office of WPB's Special Projects Salvage Branch. Equipment sold with the plant, unused since 1932, consists of steel rail, motors, generators, driers, blowers, crushers, boilers, machine tools, and other items.

PITTSBURGH—There is little change in the market here and supplies seem to be well balanced with demand. There are no tight spots at present and many mills are becoming more choosy.

PHILADELPHIA—Shipments to mills are reported to be better, in a spotty way, with supplies coming into scrap yards slowly. A two-month household and farm drive being started here by WPB's General Salvage Section is to enlist the aid of 150 licensed scrap dealers, who will collect scrap directly from holders who wish to sell it, under a system of zones. Donated scrap is to be collected by five Philadelphia charities, the principal one being the Salvation Army, which will turn the material over to dealers. This will eliminate scrap piles about the city and spread the preparation, both in time and geographically. This district is believed to be the first to attempt such a system.

CHICAGO—The movement of scrap in this area is still below consumption. Mill buyers are growing very much concerned over this continued deficit and are stressing the need for haste in corrective action. Chief among the steps recommended is the establishment of yard wage rates at a par with other war plant wages. Some time ago the yards petitioned for permission to do this, but the WLB has not yet rendered a decision. Meanwhile yards report a steady loss in workers due to the wage inequality.

BIRMINGHAM—With steel mills in this district still possessing large inventories, current shipments to mills are approximately 50 per cent under volume two months ago. Most of this movement is to Northern mills.

BOSTON—Scrap piles have at last thawed out and there is more life in yards. There is no pep to business, however. Big manufacturing plants continue to turn out tonnages of turnings for which there is little demand. Mills don't

				
	<p><b>THE OUTSTANDING</b> <i>Coolant Pump</i> <b>TODAY —</b></p> <p>There is a Ruthman Coolant Pump for almost every purpose. However if any of these pumps do not fulfill your requirements furnish us with a blue print that will show the changes required and we will be glad to make the desired changes. These redesigned pumps will of course contain all the special features of the standard pumps.</p> <p><i>Write us about your problem.</i></p>			
				

**The RUTHMAN MACHINERY COMPANY • CINCINNATI, OHIO**

## SCRAP

want turnings unless equal tonnages of heavy scrap are shipped with them. Heavy scrap allocations, however, prevent such combination shipments.

**BUFFALO**—Members of the Buffalo Scrap Institute, which includes all yard proprietors in the district, have signed a WMC anti-labor piracy agreement in their groping for a solution to the serious manpower problem. Operations continue at a slow pace, with scrap usually shipped to Buffalo from the eastern part of New York State being allocated to the Youngstown area. Receipts of local scrap are limited by the amounts yards are able to bring in on their own trucks and tractors. The army of "junkies" have vanished into war plants where the pickings are better.

**CINCINNATI**—While the movement of scrap is reported slowing up, there seems to be no stringency among consumers. Mills are apparently satisfied with present inventories, and while foundry users are resisting shipment of remote scrap to them, there appears to be no imminent urgency among these melters. Yard operations are reported slow because of the lack of ample man power.

**ST. LOUIS**—Improvement in the receipts of scrap to the St. Louis industrial district is noted, with better weather prevailing. Mills' inventories are higher. A shortage is reported in one item, No. 2 heavy melting steel. Shipments against allocations are coming from the southwest.

### Gets Scrap Award

••• The first Wisconsin firm to receive the WPB merit award banner for scrap producing efforts is the Silver Steel Co., Racine, Wis. Its 38 workers produced 47,628 tons of scrap metal last year.

### COMING EVENTS

March 18—Joint Meeting Engineers Club and American Society for Metals, St. Louis.

March 25 to 27—American Society of Tool Engineers, Milwaukee.

April 8 to 10—Electrochemical Society, Pittsburgh.

April 12 to 16—American Chemical Society, Detroit.

April 28 to 30—American Foundrymen's Association, St. Louis.

April 29 to 30—American Institute of Mining and Metallurgical Engineers, Cleveland.



### TO THOSE

#### WHO MUST WAIT

Even though priorities may prevent your obtaining new equipment at present—there's no priority on working out plans and problems now for post-Victory operations. Our representatives will gladly cooperate. Write for Bulletin.

The two Roots-Connersville motor-driven Centrifugal Gas Boosters shown above are delivering blast furnace gas in a large automobile plant, thus helping to maintain the capacity production demanded by their war-work schedule.

**ROOTS-CONNERSVILLE BLOWER CORP.**  
303 Ohio Avenue Connersville, Indiana



**INDUSTRIAL  
AND  
ORNAMENTAL**

**ANY  
METAL**

**ANY  
PERFORATION**

### ARE ESSENTIAL IN TIMES OF WAR AND PEACE

They are used in the manufacture of airplanes, battleships, explosives and in many important and essential industries such as the processing of grain, food products, petroleum, coal, etc. We make all sizes and shapes of holes to meet the most exacting conditions.

**The Harrington & King Co.**  
PERFORATING

5657 FILLMORE ST., CHICAGO

114 LIBERTY ST., NEW YORK



# SCRAP PRICES

## IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES																		
(All Prices Are Per Gross Ton)																		
BASIC OPEN HEARTH GRADES			BLAST FURNACE GRADES				Low Phos.		Heavy Structural and Plate			Foundry Steel						
No. 1 & 2 Hvy. Melt. No. 1 Cp. Bk. Shts. No. 1 & 2 Bundles		Unbale <sup>d</sup> * Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shovelling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crank-shafts	Alloy Free Low Phos. Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles	
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	\$20.00	\$15.00	\$15.00	\$16.00	\$17.00	\$17.50	\$25.00	\$22.50	\$21.50	\$22.00	\$22.50	\$21.50	\$22.00	\$21.00	\$21.50	\$18.00	\$19.50	\$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50	
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75	
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50	
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25	
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25	
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00	
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85	
Toledo, Ohio		12.85	12.85	13.85	14.85	15.35												
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50	
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburgh, Cal.; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00	
Minnisqua, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50	
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.50	15.00	12.50	14.00	15.50	

\* Baled turnings are \$5 per gross ton higher.

**BUNDLES:** Tin can bundles are \$4 below dealers' No. 2 bundles. No. 3 bundles are \$2 less than No. 1 heavy melting.

**AT NEW YORK** city or Brooklyn, the maximum shipping point price is \$15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is \$15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of \$6.66 per ton.

**SWITCHING CHARGES:** Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati\*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburgh, Cal., 42c.; Middletown, 14c.; Sparrows Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. \*At Cincinnati, for basic open hearth grades, foundry steel and auto springs and crankshafts, deduct 80c. per ton.

**PITTSBURGH** basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakland, Cal.

**MAXIMUM** prices of inferior grades shall continue to bear same differential below corresponding grades as existed during the period Sept. 1, 1940, to Jan. 31, 1941. Superior grades cannot be sold at a premium without approval of OPA. Special preparation charges in excess of the above prices are banned. Whenever any electric furnace or foundry grades are purchased for open hearth or blast furnace use, prices may not exceed the prices above for the corresponding open hearth grades.

**MAXIMUM SHIPPING POINT PRICE**—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing

point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton\*, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.\* For exceptions see official order.

**UNPREPARED SCRAP:** For unprepared scrap, maximum prices shall be \$3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made \$4) less maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge \$2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

Maximum price of all scrap in a vehicle is that of the lowest price grade in the shipment. This limitation does not apply to vessel shipments if grades are segregated.

Where scrap is to undergo preparation prior to its arrival at the point of delivery, such scrap is not at its shipping point, as that phrase is defined above, until after preparation has been completed. For special preparation charges, consult official order.

**CHEMICAL BORINGS:** No. 1 (new, clean, containing not more than 1 per cent oil), \$1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), \$2 less than No. 1 heavy melting. If loaded in box cars add 75c.

**UNPREPARED CAST IRON SCRAP**—Except for heavy breakable cast, unprepared scrap is given a price ceiling of \$2.50 per ton less than the maximum prices for the corresponding grade of prepared cast iron scrap. Where scrap is to undergo preparation prior to arrival at the point of delivery, such scrap is not considered at shipping point until preparation is completed.

Consumers of cast scrap may pay the shipping point price plus established charge for transporting the scrap to their planes. In the case of deliveries by truck, the cast scrap buyer must obtain from the seller a certification, made out to OPA.

\*At Memphis 50c.; Great Lakes ports \$1; New England \$1.25.

RAILROAD SCRAP						
No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	Scrap Rails			
			3 ft. and Under	2 ft. and Under	18 in. and Under	
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown, Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown, Chicago, Philadelphia, Sparrows Pt., Wilmington, Birmingham, Los Angeles, San Francisco, Buffalo, Detroit, Duluth, Kansas City, Mo., Kokomo, Ind., Seattle, St. Louis.	\$20.50 21.00 19.75 18.00 20.25 18.85 19.00 17.00 19.25 15.50 18.50	\$21.50 22.00 20.75 19.00 21.25 19.85 20.00 18.00 20.25 16.50 19.50	\$23.00 23.50 22.25 20.50 21.35 21.50 21.50 20.50 21.75 18.00 21.00	\$23.50 24.00 22.75 21.00 21.85 22.00 22.00 20.00 22.25 18.50 21.50	\$23.75 24.25 23.00 21.25 22.10 22.25 20.25 22.50 18.75 18.75 21.75	\$24.00 24.50 23.25 21.50 22.35 22.50 22.50 20.50 22.75 19.00 22.00

CAST IRON SCRAP			
	Group A	Group B	Group C
No. 1 cupola cast.	\$18.00	\$19.00	\$20.00
Clean auto cast.	18.00	19.00	20.00
Unstripped motor blocks.	15.50	16.50	17.50
Stove Plate.	17.00	18.00	19.00
Heavy Breakable Cast.	15.50	16.50	17.50
Charging Box Size Cast.	17.00	18.00	19.00
Misc. Malleable.	20.00	21.00	22.00
Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.			
Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.			
Group C: States not named in A and B; switching district of Kansas City, Kan., Mo.			

# Comparison of Prices

Advances Over Past Week in **Heavy Type**; Declines in *Italics*.

[Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Mar. 16, 1943	Mar. 9, 1943	Feb. 16, 1943	Mar. 17, 1942
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00

Tin and Terne Plate: (Dollars Per Base Box)	Mar. 16, 1943	Mar. 9, 1943	Feb. 16, 1943	Mar. 17, 1942
Tin plate, standard cokes	\$5.00	\$5.00	\$5.00	\$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30

Bars and Shapes: (Cents Per Lb.)	Mar. 16, 1943	Mar. 9, 1943	Feb. 16, 1943	Mar. 17, 1942
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40

Wire and Wire Products: (Cents Per Lb.)	Mar. 16, 1943	Mar. 9, 1943	Feb. 16, 1943	Mar. 17, 1942
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55

Rails: (Dollars Per Gross Ton)	Mar. 16, 1943	Mar. 9, 1943	Feb. 16, 1943	Mar. 17, 1942
Heavy rails	\$40.00	\$40.00	\$40.00	\$40.00
Light rails	40.00	40.00	40.00	40.00

Semi-Finished Steel: (Dollars Per Gross Ton)	Mar. 16, 1943	Mar. 9, 1943	Feb. 16, 1943	Mar. 17, 1942
Rerolling billets	\$34.00	\$34.00	\$34.00	\$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00

Wire Rods and Skelp: (Cents Per Lb.)	Mar. 16, 1943	Mar. 9, 1943	Feb. 16, 1943	Mar. 17, 1942
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 140 to 144.

Pig Iron: (Per Gross Ton)	Mar. 16, 1943	Mar. 9, 1943	Feb. 16, 1943	Mar. 17, 1942
No. 2 fdy., Philadelphia	\$25.89	\$25.89	\$25.89	\$25.84
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	24.68	24.68	24.68	24.06
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.39	25.39	25.39	25.34
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	31.34	31.34	31.34	31.34
Ferromanganese‡	135.00	135.00	135.00	120.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.  
‡For carlots at seaboard.

Scrap: (Per Gross Ton)	Mar. 16, 1943	Mar. 9, 1943	Feb. 16, 1943	Mar. 17, 1942
Heavy melting steel, P'gh.	\$20.00	\$20.00	\$20.00	\$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	23.00
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00

Coke, Connellsville: (Per Net Ton at Oven)	Mar. 16, 1943	Mar. 9, 1943	Feb. 16, 1943	Mar. 17, 1942
Furnace coke, prompt	\$6.50	\$6.50	\$6.50	\$6.00
Foundry coke, prompt	7.375	7.375	6.875	6.875

Non-Ferrous Metals: (Cents per Lb. to Large Buyers)	Mar. 16, 1943	Mar. 9, 1943	Feb. 16, 1943	Mar. 17, 1942
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

## Composite Prices . . .

FINISHED STEEL	Mar. 16, 1943
One week ago	2.30467c. a Lb.
One month ago	2.30467c. a Lb.
One year ago	2.30467c. a Lb.

HIGH	LOW
1943	2.30467c.
1942	2.30467c.
1941	2.30467c.
1940	2.30467c., Jan. 2
1939	2.35367c., Jan. 3
1938	2.58414c., Jan. 4
1937	2.58414c., Mar. 9
1936	2.32263c., Dec. 28
1935	2.07642c., Oct. 1
1934	2.15367c., Apr. 24
1933	1.95578c., Oct. 3
1932	1.89196c., July 5
1931	1.99626c., Jan. 13
1930	2.25488c., Jan. 7
1929	2.31773c., May 28

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

PIG IRON	Mar. 16, 1943
One week ago	23.61 a Gross Ton
One month ago	23.61 a Gross Ton
One year ago	23.61 a Gross Ton

HIGH	LOW
23.61	23.61
23.61	23.61
23.61, Mar. 20	23.45, Jan. 2
23.45, Dec. 23	22.61, Jan. 2
22.61, Sept. 19	20.61, Sept. 12
23.25, June 21	19.61, July 6
23.25, Mar. 9	20.25, Feb. 16
19.74, Nov. 24	18.73, Aug. 11
18.84, Nov. 5	17.83, May 14
17.90, May 1	16.90, Jan. 27
16.90, Dec. 5	13.56, Jan. 3
14.81, Jan. 5	13.56, Dec. 6
15.90, Jan. 6	14.79, Dec. 15
18.21, Jan. 7	15.90, Dec. 16
18.71, May 14	18.21, Dec. 17

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

SCRAP STEEL	Mar. 16, 1943
One week ago	\$19.17 a Gross Ton
One month ago	\$19.17 a Gross Ton
One year ago	\$19.17 a Gross Ton

HIGH	LOW
\$19.17	\$19.17
\$19.17	\$19.17
\$22.00, Jan. 7	\$19.17, Apr. 10
21.83, Dec. 30	16.04, Apr. 9
22.50, Oct. 3	14.08, May 16
15.00, Nov. 22	11.00, June 7
21.92, Mar. 30	12.67, June 9
17.75, Dec. 21	12.67, June 9
13.42, Dec. 10	10.33, Apr. 29
13.00, Mar. 13	9.50, Sept. 25
12.25, Aug. 8	6.75, Jan. 3
8.50, Jan. 12	6.43, July 5
11.33, Jan. 6	8.50, Dec. 29
15.00, Feb. 18	11.25, Dec. 9
17.58, Jan. 29	14.08, Dec. 3

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.



# Prices of Finished Iron and Steel . . .

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, reductions, and in most cases freight absorbed to meet competition. Delivered prices do not reflect new 3 per cent tax on freight rates.

Basing Point ↓ Product													10 DELIVERED TO		
	Pitts- burgh	Chicago	Gary	Cleve- land	Birm- ingham	Buffalo	Youngs- town	Spar- rows Point	Granite City	Middle- town, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	Detroit	New York	Phila- delphia
<b>SHEETS</b>															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.22¢	2.35¢	2.28¢
Cold rolled <sup>1</sup>	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.17¢	3.41¢	3.39¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.75¢	3.68¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.47¢	3.73¢	3.69¢
Long ternes <sup>2</sup>	3.80¢		3.80¢									4.55¢		4.18¢	4.14¢
<b>STRIP</b>															
Hot rolled <sup>3</sup>	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.22¢	2.48¢	
Cold rolled <sup>4</sup>	2.80¢	2.90¢		2.80¢			2.80¢		(Worcester = 3.00¢)				2.92¢	3.18¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.58¢	
Commodity C <sub>7</sub> R	2.95¢			2.95¢			2.95¢		(Worcester = 3.35¢)				3.07¢	3.33¢	
<b>TIN MILL PRODUCTS</b>															
Coke tin plate, base box	\$5.00	\$5.00	\$5.00						\$5.10					5.38¢	5.34¢
Electrolytic tin plate, box	\$4.50		\$4.50												
Black plate, 29 gage <sup>5</sup>	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ <sup>12</sup>			3.39¢
Mfg. ternes, special box	\$4.30	\$4.30	\$4.30						\$4.40						
<b>BARS</b>															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			(Duluth = 2.25¢)		2.52¢	2.80¢	2.27¢	2.51¢	2.49¢
Rail steel <sup>6</sup>	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.52¢	2.80¢			
Reinforcing (billet) <sup>7</sup>	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.52¢	2.55¢ <sup>13</sup>	2.27¢	2.40¢	
Reinforcing (rail) <sup>7</sup>	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.52¢	2.55¢ <sup>13</sup>	2.27¢		2.49¢
Cold finished <sup>8</sup>	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)					3.01¢	2.99¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢			(Bethlehem, Massillon, Canton = 2.70¢)				2.82¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.47¢		
									(Coatesville and Claymont = 2.10¢)						
<b>PLATES</b>															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.25¢ <sup>11</sup>		2.47¢	2.65¢	2.33¢	2.30¢	2.155¢
Floor plates	3.35¢	3.35¢									3.72¢	4.00¢		3.73¢	3.69¢
Alloy	3.50¢	3.50¢							(Coatesville = 3.50¢)		3.97¢	4.15¢		3.71¢	3.60¢
<b>SHAPES</b>															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢			(Bethlehem = 2.10¢)		2.47¢	2.75¢		2.28¢	2.22¢
<b>SPRING STEEL, C-R</b>															
0.26 to 0.50 Carbon	2.80¢			2.80¢					(Worcester = 3.00¢)						
0.51 to 0.75 Carbon	4.30¢			4.30¢					(Worcester = 4.50¢)						
0.76 to 1.00 Carbon	6.15¢			6.15¢					(Worcester = 6.35¢)						
1.01 to 1.25 Carbon	8.35¢			8.35¢					(Worcester = 8.55¢)						
<b>WIRE<sup>9</sup></b>															
Bright <sup>14</sup>	2.60¢	2.60¢		2.60¢	2.60¢				(Worcester = 2.70¢)			3.10¢			2.94¢
Galvanized															
Spring (High Carbon)	3.20¢	3.20¢		3.20¢					(Worcester = 3.30¢)			3.70¢			3.54¢
<b>PILING</b>															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.74¢

<sup>1</sup> Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. <sup>2</sup> Unassorted 8-lb. coating. <sup>3</sup> Widths up to 12 in. <sup>4</sup> Carbon 0.25 per cent and less. <sup>5</sup> Applies to certain width and length limitations. <sup>6</sup> For merchant trade. <sup>7</sup> Prices for straight length material only, from a producer to a consumer. Functional discount of 25c. per 100 lb. to fabricators. <sup>8</sup> Also shafting. For quantities of 20,000 to 39,999 lb. <sup>9</sup> Carload lot to manufacturing trade. <sup>10</sup> These prices do not apply if the customary means of transportation (rail and water) are not used. <sup>11</sup> Ship plates only. <sup>12</sup> Boxed. <sup>13</sup> Portland and Seattle price, San Francisco price is 2.50c. <sup>14</sup> This bright wire base price to be used in figuring annealed and bright finish wires, commercial spring wire and galvanized wire.

**GOVERNMENT CEILINGS**—Price Schedule No. 6 issued April 16, 1941, governs steel mill prices; Price Schedule No. 49 governs warehouse prices, which are on another page of this issue.

**EXCEPTIONS TO PRICE SCHEDULE No. 6**—On hot rolled carbon bars, Phoenix Iron Co. may quote 2.35c. at established basing points; Calumet Steel division of Borg Warner may quote 2.35c., Chicago, on bars from its 8-in. mill; Joslyn Mfg. Co. may quote 2.35c., Chicago base. On rail steel bars Sweets Steel Co. may quote 2.35c., f.o.b. mill. On hot rolled sheets, Andrews Steel Co. may quote for shipment to Detroit area on Middletown base. On galvanized sheets, Andrews Steel may quote 3.75c., at established basing points. On hot rolled strip, Joslyn Mfg. Co. may quote 2.30c., Chicago base. On plates, Granite City Steel Co. may quote 2.35c., f.o.b. mill, and Central Iron & Steel Co. may quote 2.20c., f.o.b. basing points. On shapes, Phoenix Iron Co. may quote 2.30c. established basing points and 2.50c. Phoenixville for export.

On rail steel merchant bars, Eckels-Nye Corp. may charge 2.40c. On tubing, South Chester Tube Co. may price Gulf or Pacific Coast all-rail shipments and shipments west of Harrisburg on basis of f.o.b. Chester. On lend-lease sales to eastern seaboard, Sheffield Steel Co. and Colorado Fuel & Iron Corp. may sell f.o.b. mill. **SEMIFINISHED STEEL**—Follansbee Steel Corp. may sell forging billets at \$49.50 f.o.b. Toronto; Continental Steel Corp. may sell Acme Steel Co. at \$34 for rerolling billets plus extras and freight; Ford Motor Co. may sell rerolling billets at \$34 f.o.b. Dearborn; Andrews Steel Co. may sell forging billets at \$50 at established basing points and slabs at \$41; Empire Sheet and Tin Plate may sell slabs at \$41 at established basing points and sheet bars at \$39 f.o.b. mill; on lend-lease sales Northwestern Steel & Wire Co. may charge \$41 per gross ton f.o.b. mill for rerolling billets; on lend-lease sales Wheeling Steel Corp. may charge \$36 per ton for small billets, f.o.b. Portsmouth and \$37 per ton for sheet bars f.o.b. Portsmouth; Laclede Steel Co. on semifinished sales for lend-lease shipped to eastern seaboard may use Chicago basing point prices f.o.b. Alton and Madison, Ill. **ALLOY STEEL BARS**—Texas Steel Co. may use Chicago base f.o.b. Fort Worth.

# PRICES

## SEMI-FINISHED STEEL

For exceptions, see preceding page

### Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are \$2.25 higher; f.o.b. Duluth, billets only, \$2 higher. Delivered prices do not reflect new per cent tax on freight rates.

Per Gross Ton

Rerolling ..... \$34.00  
Forging quality ..... 40.00  
Alloy Steel: Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton..... \$54.00

### Shell Steel

Per Gross Ton

3 in. to 12 in. .... \$52.00  
12 in. to 18 in. .... 54.00  
18 in. and over. .... 56.00  
Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.  
Prices delivered Detroit are \$2.25 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

### Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton

Open hearth or bessemer ..... \$34.00

### Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.

Grooved, universal and sheared ... 1.90c.

### Wire Rods

(No. 5 to 9/32 in.)

Per Lb.

Pittsburgh, Chicago, Cleveland ... 2.00c.  
Worcester, Mass. .... 2.10c.  
Birmingham .... 2.00c.  
San Francisco .... 2.50c.  
Galveston .... 2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

## TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

Base per lb.

High speed ..... 67c.  
Straight molybdenum ..... 54c.  
Tungsten-molybdenum ..... 57½c.  
High-carbon-chromium ..... 43c.  
Oil hardening ..... 24c.  
Special carbon ..... 22c.  
Extra carbon ..... 18c.  
Regular carbon ..... 14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi, 3c. higher.

## CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

### Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

### Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hotstrip	17.00c.	17.50c.	24.00c.	35.00c.
Cold st.	22.00c.	22.50c.	32.00c.	52.00c.

### Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

\*Includes annealing and pickling.

## N. E. STEELS (Hot Rolled) Extras for Alloy Content

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulfur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar Strip	Billets, Blooms and Slabs	Bars and Bar Strip	Billets, Blooms and Slabs
NE 1330	.28/.33	1.60/1.90	.040	.040	.20/.35				.10c	\$2.00		
NE 1335	.33/.38	1.60/1.90	.040	.040	.20/.35				.10	2.00		
NE 1340	.38/.43	1.60/1.90	.040	.040	.20/.35				.10	2.00		
NE 1345	.43/.48	1.60/1.90	.040	.040	.20/.35				.10	2.00		
NE 1350	.48/.53	1.60/1.90	.040	.040	.20/.35				.10	2.00		
NE 8020	.18/.23	1.00/1.30	.040	.040	.20/.35			.10/.20	.45	9.00	.95c	\$19.00
NE 8442*	.40/.45	1.30/1.60	.040	.040	.20/.35			.30/.40	.90	18.00	1.40	28.00
NE 8613	.12/.17	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8615	.13/.18	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8617	.15/.20	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8620	.18/.23	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8630	.28/.33	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8635	.33/.38	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8637	.35/.40	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8640	.38/.43	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8642	.40/.45	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8645	.43/.48	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8650	.48/.53	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8720	.18/.23	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.20/.30	.80	16.00	1.30	26.00
NE 9255	.50/.60	.70/.95	.040	.040	1.80/2.20				.40c	8.00		
NE 9260	.55/.65	.75/1.00	.040	.040	1.80/2.20				.40	8.00		
NE 9262	.55/.65	.75/1.00	.040	.040	1.80/2.20	.20/.40			.65	13.00		
NE 9415	.13/.18	.80/1.10	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30c	\$26.00
NE 9420	.18/.23	.80/1.10	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30	26.00
NE 9422	.20/.25	.80/1.10	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30	26.00
NE 9430	.28/.33	.90/1.20	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30	26.00
NE 9435	.33/.38	.90/1.20	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30	26.00
NE 9437	.35/.40	.90/1.20	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30	26.00
NE 9440	.38/.43	.90/1.20	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30	26.00
NE 9442	.40/.45	1.00/1.30	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.85	17.00	1.35	27.00
NE 9445	.43/.48	1.00/1.30	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.85	17.00	1.35	27.00
NE 9450	.48/.53	1.20/1.50	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.85	17.00	1.35	27.00
NE 9537*	.35/.40	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.70	.15/.25	1.20	24.00	1.70	34.00
NE 9540*	.38/.43	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.70	.15/.25	1.20	24.00	1.70	34.00
NE 9542*	.40/.45	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.70	.15/.25	1.20	24.00	1.70	34.00
NE 9550*	.48/.53	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.70	.15/.25	1.20	24.00	1.70	34.00
NE 9630	.28/.33	1.20/1.50	.040	.040	.40/.60	.40/.60			.80	16.00	1.30	26.00
NE 9635	.33/.38	1.20/1.50	.040	.040	.40/.60	.40/.60			.80	16.00	1.30	26.00
NE 9637	.35/.40	1.20/1.50	.040	.040	.40/.60	.40/.60			.80	16.00	1.30	26.00
NE 9640	.38/.43	1.20/1.50	.040	.040	.40/.60	.40/.60			.80	16.00	1.30	26.00
NE 9642	.40/.45	1.30/1.60	.040	.040	.40/.60	.40/.60			.85	17.00	1.35	27.00
NE 9645	.43/.48	1.30/1.60	.040	.040	.40/.60	.40/.60			.85	17.00	1.35	27.00
NE 9650	.48/.53	1.30/1.60	.040	.040	.40/.60	.40/.60			.85	17.00	1.35	27.00

\*Recommended for large sections only. Note: The extras shown above are in addition to a base price of 2.70c. per 100 lb., on finished products and \$54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, \$5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

## ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh) Per Lb.

Field grade ..... 3.20c.  
Armature ..... 3.55c.  
Electrical ..... 4.05c.  
Motor ..... 4.95c.  
Dynamo ..... 5.65c.  
Transformer 72 ..... 6.15c.  
Transformer 65 ..... 7.15c.  
Transformer 58 ..... 7.65c.  
Transformer 52 ..... 8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

## WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham

Base per Keg

Standard wire nails ..... \$2.55  
Coated nails ..... 2.55  
Cutnails, carloads ..... 3.85

Base per 100 Lb.

Annealed fence wire ..... \$3.05  
Annealed galvanized fence wire ..... 3.40

Base Column

Woven wire fence\* ..... 67  
Fence posts (carloads) ..... 69  
Single loop bale ties ..... 59  
Galvanized barbed wire† ..... 70  
Twisted barless wire ..... 70

\*15½ gage and heavier. †On 80-rod spools in carload quantities.

## RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb., gross ton ..... \$40.00  
Angle bars, 100 lb. .... 2.70  
(F.o.b. Basing Points) Per Gross Ton  
Light rails (from billets) ..... \$40.00  
Light rails (from rail steel) ..... 39.00

Base per Lb.

Cut spikes ..... 3.00c.  
Screw spikes ..... 5.15c.  
Tie plates, steel ..... 2.15c.  
Tie plates, Pacific Coast ..... 2.30c.  
Track bolts ..... 4.75c.  
Track bolts, heat treated, to railroads ..... 5.00c.  
Track bolts, jobbers discount ..... 63-5

Basing Points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond.

## ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	\$6.00	\$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00



# PRICES

## BOLTS, NUTS, RIVETS, SET SCREWS

### Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

#### Machine and Carriage Bolts:

	Per Cent Off List
1/2 in. & smaller x 6 in. & shorter.....	65 1/2
9/16 & 5/8 in. x 6 in. & shorter.....	63 1/2
3/4 to 1 in. x 6 in. & shorter.....	61
1 1/4 in. and larger, all length.....	59
All diameters over 6 in. long.....	59
Lag, all sizes.....	62
Plow bolts.....	65

#### Nuts, Cold Punched or Hot Pressed:

(Hexagon or Square)

1/2 in. and smaller.....	62
9/16 to 1 in. inclusive.....	59
1 1/4 to 1 1/2 in. inclusive.....	57
1 3/4 in. and larger.....	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

#### Semi-Fin. Hexagon Nuts U.S.S. S.A.E.

7/16 in. and smaller.....	64
1/2 in. and smaller.....	62
5/8 in. through 1 in. ....	60
9/16 to 1 in. ....	59
1 1/4 in. through 1 1/2 in. ....	57
1 3/4 in. and larger.....	56

In full container lots, 10 per cent additional discount.

#### Stove Bolts

Packages, nuts loose.....	71 and 10
In packages, with nuts attached.....	71
In bulk.....	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

#### Large Rivets (1/2 in. and larger)

Base per 100 lb.

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham.....\$3.75

#### Small Rivets (7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham.....65 and 5

#### Cap and Set Screws

Per Cent Off List

Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in. ....	64
Upset set screws, cup and oval points	71
Milled studs.....	46
Flat head cap screws, listed sizes.....	36
Filister head cap, listed sizes.....	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

## PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect new 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston††.....	\$25.53	\$25.03	\$26.53	\$26.03		
Brooklyn.....	27.65			28.15		
Jersey City.....	26.62	26.12	27.62	27.12		
Philadelphia.....	25.89	25.39	26.89	26.39		
Bethlehem, Pa.....	\$25.00	\$24.50	\$26.00	\$25.50		
Everett, Mass.††.....	25.00	24.50	26.00	25.50		
Swedeland, Pa.....		24.50			\$29.00	
Steelton, Pa.....		24.50			29.50	
Birdsboro, Pa.....	25.00	24.50	26.00	25.50		
Sparrows Point, Md.....	25.00	24.50				
Erie, Pa.....	24.00	23.50	25.00	24.50		
Newville Island, Pa.....	24.00	23.50	24.50	24.00		
Sharpsville, Pa.*.....	24.00	23.50	24.50	24.00		
Buffalo.....	24.00	23.00	25.00	24.50	29.50	
Cincinnati.....	24.68	24.68		25.18		
Canton, Ohio.....	25.47	24.97	25.97	25.47		
Mansfield, Ohio.....	26.06	25.56	26.56	26.06		
St. Louis.....	24.50	24.00				
Chicago.....	24.00	23.50	24.50	24.00		\$31.36
Granite City, Ill.....	24.00	23.50	24.50	24.00		
Cleveland.....	24.00	23.50	24.50	24.00		
Hamilton, Ohio.....	24.00	23.50				
Toledo.....	24.00	23.50	24.50	24.00		
Youngstown.....	24.00	23.50	24.50	24.00		
Detroit.....	24.00	23.50	24.50	24.00		
Lake Superior fc.....					\$28.00	
Lyles, Tenn. fc†.....					33.00	
St. Paul.....	26.76		27.26	26.76		
Duluth.....	24.50	24.00	25.00	24.50		
Birmingham.....	20.38	19.00	25.00			
Los Angeles.....	27.25					
San Francisco.....	27.25					
Seattle.....	27.25					
Provo, Utah.....	22.00	21.50				
Montreal.....	27.50	27.50		28.00		
Toronto.....	25.50	25.50		26.00		

GRAY FORGE IRON: Valley or Pittsburgh furnace.....\$23.50

\*Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

\*\*Pittsburgh Ferromanganese Co. (Chester furnace only) may charge \$2.25 a ton over maximum basing point prices.

†Price shown is for low-phosphorous iron; high-phosphorous sells for \$28.50 at the furnace.

††Eastern Gas & Fuel Associates, Boston, is permitted to sell pig iron produced by its selling company, Mystic Iron Works, Everett, Mass., at \$1 per gross ton above maximum prices.

Delta Chemical & Iron Co., Chicago, may charge \$30 for charcoal iron at its Delta, Mich., furnace.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, \$2 per ton extra may be charged for 0.05 to 0.075 per cent nickel content and \$1 per ton extra for each additional 0.025 per cent nickel.

## WAREHOUSE PRICES

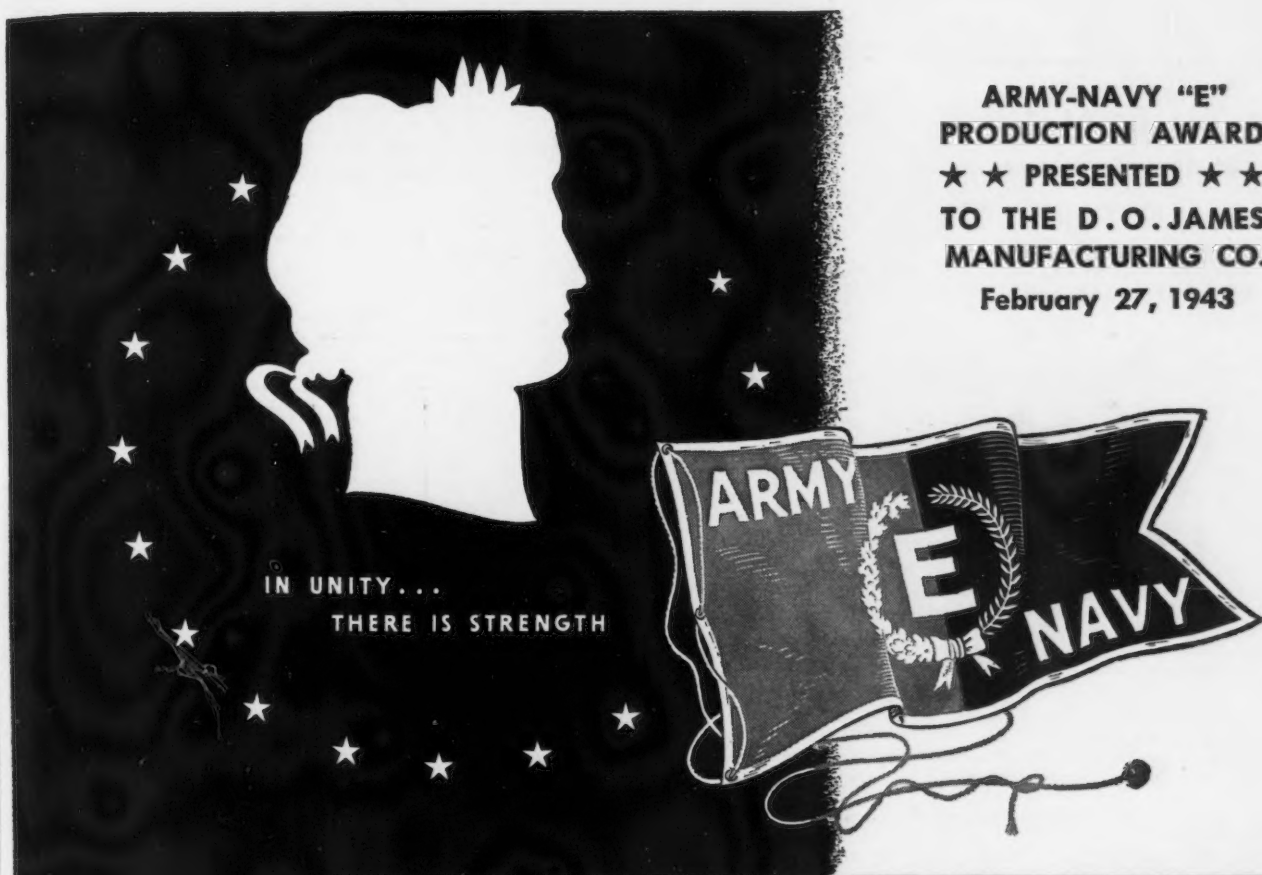
(Delivered Metropolitan areas, per 100 lb. These prices do not necessarily apply for dislocated tonnage shipments when the f.o.b. City prices are used in conformance with OPA Schedule 49)

Cities	SHEETS			STRIP		Plates (1/4 in. and heavier)	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 ga.)	Cold Rolled	Galv. (24 ga.)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled 2300	Hot Rolled 3100	Cold Drawn 2300	Cold Drawn 3100
Pittsburgh.....	\$3.35	\$4.00	\$4.75	\$3.60	\$3.20	\$3.40	\$3.40	\$3.35	\$3.65	\$7.45	\$5.75	\$8.40	\$6.75
Chicago.....	3.25	4.10	4.85 <sup>1</sup>	3.60	3.50	3.55	3.55	3.50	3.75	7.35	5.65	8.40	6.75
Cleveland.....	3.35	4.05	4.62	3.50	3.20	3.40	3.58	3.25	3.75	7.55	5.85	8.40	6.75
Philadelphia.....	3.55	4.63	4.90	3.95	3.31	3.55	3.55	3.85	4.06	7.31	5.86	8.56	7.18
New York.....	3.58	4.60 <sup>2</sup>	5.00	3.96 <sup>6</sup>	3.51	3.76	3.75	3.84	4.09	7.60	5.90	8.84	7.19
Detroit.....	3.43	4.30	4.84 <sup>1</sup>	3.43	3.40	3.60	3.65	3.43	3.80	7.67	5.97	8.70	7.05
Buffalo.....	3.25	4.30 <sup>1</sup>	4.75 <sup>4</sup>	3.82	3.52	3.62	3.40	3.35	3.75	7.35	5.65	8.40	6.75
Boston.....	3.71	4.68	5.11	4.06	3.46	3.85	3.85	3.98	4.13	7.77	6.07	8.91	7.26
Birmingham.....	3.45 <sup>3</sup>		4.75 <sup>1</sup>	3.70 <sup>3</sup>		3.55 <sup>3</sup>	3.55 <sup>3</sup>	3.50 <sup>3</sup>	4.43				
St. Louis.....	3.39	4.24 <sup>2</sup>	4.99 <sup>1</sup>	3.74	3.61	3.69	3.69	3.64	4.02	7.72	6.02	8.77	7.12
St. Paul.....	3.50	4.35	5.00	3.85	3.83	3.80	3.80	3.75	4.34	7.45	6.00	8.84	7.44
Milwaukee.....	3.38	4.23 <sup>2</sup>	4.98 <sup>1</sup>	3.73	3.54	3.68	3.68	3.63	3.88	7.58	5.88	8.63	6.98
Baltimore.....	3.50	5.00	5.05	4.00		3.70	3.70	3.85	4.04				
Cincinnati.....	3.42	4.37 <sup>2</sup>	4.92 <sup>1</sup>	3.67	3.45	3.65	3.68	3.60	4.00	7.69	5.99	8.50	7.10
Norfolk.....	3.85	4.50	5.40	4.10		4.05	4.05	4.00	4.15				
Washington.....	3.60	5.10	5.15	4.10		3.80	3.80	3.95	4.03				
Indianapolis.....	3.45	4.25	5.01 <sup>1</sup>	3.75	3.28	3.70	3.70	3.60	3.97	7.67	5.97	8.72	7.07
Omaha.....	3.85	4.77	5.52 <sup>1</sup>	4.20		4.15	4.15	4.10	4.42				
Memphis.....	3.85	4.66	5.25	4.10		3.95	3.95	3.90	4.31				
New Orleans.....	3.95	4.95	5.25	4.20		3.90	3.90	4.10	4.60				
Houston.....	3.75	5.43	5.25	4.30		5.25	5.25	3.75	4.50				
Los Angeles†.....	4.95	7.15	5.95	4.90		4.90	4.60	4.35	5.70	9.55	8.55	10.55	9.55
San Francisco†.....	4.55	7.55	6.60	4.50		4.65	4.35	3.95	5.55	9.80	8.80	10.80	9.80
Seattle†.....	4.65 <sup>7</sup>	6.63	5.70 <sup>7</sup>	4.25		4.75	4.45	4.20	5.75		8.00		

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb., galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: <sup>1</sup> 500 to 1499 lb. <sup>2</sup> 400 to 1499 lb. <sup>3</sup> 450 to 1499 lb. <sup>4</sup> 1000 to 1999 lb. <sup>5</sup> 0 to 1999 lb. <sup>6</sup> 300 to 10,000 lb. At Philadelphia galvanized sheets, 25 or more bundles; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; San Francisco, hot rolled sheets, 400 to 39,999 lb., galvanized and cold rolled sheets, 750 to 4999 lb., cold fin. bars, 0-299 lb.; hot rolled alloy bars, 0-4999 lb.; Seattle, cold finished bars, 1000 lb. and over, hot rolled alloy bars, 0-1999 lb.; Memphis, hot rolled sheets, 400 to 1999 lb., galvanized sheets, 150 and over; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, cold rolled sheets, 300 to 1999 lb.; galvanized sheets, 1 to 6 bundles; cold finished bars, 1 to 99 lbs.; SAE bars, 100 lb. Extras for size, quality, etc., apply on above quotations.

† Los Angeles, San Francisco and Seattle prices reflect special provisions of amendment No. 2 to OPA Price Schedule No. 49.

ARMY-NAVY "E"  
 PRODUCTION AWARD  
 ★ ★ PRESENTED ★ ★  
 TO THE D.O. JAMES  
 MANUFACTURING CO.  
 February 27, 1943



**IN APPRECIATION . . .** It is very gratifying to publicly acknowledge our appreciation of receiving the Army-Navy "E" Production Award . . . this ensign and lapel insignia is a testimonial to the mutuality of the cooperation with . . . and the understanding of . . . our employees and management. This cooperative understanding has been productive of successful attainments that have resulted in a schedule maintenance and a quality to our products that make us proud in knowing that after 55 years of making all types of gears and gear reducers that we have again been given the opportunity of serving our country. Lastly . . . may we express extreme appreciation of the combined efforts of our employees, our suppliers, our executive control and management . . . and we solemnly pledge to do all possible to maintain and perpetuate this record of successful achievement during and after this emergency.

#### POWER SAVING PRODUCTS

Planetary Spur Gear, Medium and Heavy Duty Worm Gear, Generated Continuous-Tooth Herringbone Gear and Motorized Speed Reducers, in types to drive up, down, horizontally or at an angle, Cut Spur, Straight and Spiral Bevel, Mitre, Spiral, Worm, Internal, Helical and Herringbone Gears in all sizes and of all materials, Sprocket Wheels, Racks, Flexible and Universal Couplings.

**D.O. James** MANUFACTURING CO.

ESTABLISHED  
 1888

1140 W. MONROE STREET CHICAGO  
 Over 55 Years Making All Types of Gears and Gear Reducers



## Trade Notes

The Tool Service Co., Milwaukee, has been organized by Elmer New, R. W. Grau and W. A. Voell, to engage in the machine tool trade.

The Wisconsin Steel Treating Co., Milwaukee, has moved into a new factory at 1114 S. 41st St., that city.

Detroit Broach Co., Inc., has set up a Los Angeles branch at 115 North Robertson Boulevard.

Lockheed Aircraft Corp., Burbank, Cal., has combined all activities within the manufacturing branch of its company into a Materiel Office under the direction of Roger Lewis, director of materiel. Procurement activities within the Materiel Office are under the direction of James E. Blaine, chief of procurement.

Budd Induction Heating, Inc., a subsidiary of Budd Wheel Co., is now at full production in its new plant in Detroit. The company is a manufacturer of induction heating equipment for customers engaged in filling war orders.

Salkover Metal Processing Co., Inc., 34-16 Borden Avenue, Long Island City, N. Y., has established business for commercial controlled atmosphere electric furnace brazing, bright annealing and other specialized metallurgical operations.

Fred E. Garner Co. has opened Plant No. 2 at 1100 West Washington Street, Chicago. The engineering staff will be located at the new plant, and the general offices will remain at 43 East Ohio Street.

New Wrinkle, Inc., Dayton, Ohio, has moved its research and development laboratories to new quarters adjoining their general offices at 314 West First Street.

Palmer Products Co., Waukesha, Wis., which has converted considerable of its production facilities to war purposes, has sold its sanitary supplies division to Palmer Co., Inc., 757 N. Broadway, Milwaukee, which will produce an enlarged line of building and maintenance supplies which will be made in a portion of the Palmer Waukesha plant.

William Didier Mfg. Co. was organized at

## Blast Furnace Capacity and January Production—Net Tons

	Number of Companies	* Annual Blast Furnace Capacity	PRODUCTION			
			Pig Iron	Ferro and Spiegel	Total	Total Per Cent of Capacity
Distribution by Districts:						
Eastern . . . . .	12	11,967,680	970,281	17,609	987,890	97.2
Pittsburgh-Youngstown . . . . .	15	24,346,420	2,109,878	20,016	2,129,894	103.0
Cleveland-Detroit . . . . .	9	6,068,470	522,967	.....	522,967	101.4
Chicago . . . . .	6	12,954,800	1,108,396	.....	1,108,396	100.7
Southern . . . . .	7	4,521,910	352,214	20,077	372,291	96.9
Western . . . . .	2	822,800	72,807	.....	72,807	104.1
Total . . . . .	37	60,682,080	5,136,543	57,702	5,194,245	100.7

• • • In January, 99.8 per cent of the nation's blast furnaces smelted 5,136,543 tons of pig iron and 57,702 tons of ferromanganese and spiegeleisen, according to the American Iron and

Steel Institute, compared with 5,143,829 tons and 57,594 tons respectively in December. Last year, 4,943,616 tons of pig iron and 42,334 tons of ferroalloys were produced.

Racine, Wis., by Julius Alperovitz and Max and William Seft to deal in machinery, tools and equipment.

Industrial Investments Co., Chicago, has purchased the Wetmore Reamer Co. and the Automatic Screw Machine Products Co., both of Milwaukee.

Waukesha Foundry Co., Waukesha, Wis., has completed a new addition to its plant constructed entirely of non-critical materials, wood trusses and concrete blocks being used throughout.

Colloidal Oil Corp., 420 Lexington Avenue, New York, has established business as designing engineers and constructors for Colloidal Oil Plants for the production of a substitute oil in cooperation with the government's plan to reduce the consumption of fuel oil by 40 per cent. The new colloidal oil was developed by J. G. Coutant, vice-president of the company.

Miller Tool & Mfg. Co., Springfield, Mass., will convert a warehouse at Liberty and Cass Streets into a machine shop.

Detroit Rex Products Co., metal cleaning

engineers, has established new regional sales and service offices at 2308 Fourth Avenue, North, Birmingham, Ala.

American Screw Co. has moved its Detroit office to No. 5-267 General Motors Building.

R. L. Crane Machinery Co. is now located at 296 Delaware Avenue, Buffalo.

Willard Equipment Ltd., Vancouver, B. C., has been appointed exclusive distributors for the shovel and crane division of the Lima Locomotive Works, Inc., Lima, Ohio.

Parker Wire Goods Co., 149 Washington St., Worcester, Mass., has changed its firm name to Parker Mfg. Co. J. Z. Buckley, general manager, says the change was made because the company is manufacturing a much wider range of articles than formerly.

Clayton & Lambert Mfg. Co. has moved its general offices and entire Torch and Fire Pot Division to 14247 Tireman Avenue, Dearborn, Mich. The new plant provides an additional 56,000 sq. ft. of floor space.

Simon-Levand Co. is in the process of dissolution as a partnership, and will subsequently operate as a scrap brokerage under the name of H. Simon Co.

The Acro Electric Co., Cleveland, manufacturers of switches, has moved into a new plant at 1305 Superior Avenue with manufacturing facilities and space enlarged 300 per cent for increased production.

Plan-O-Mill Corp., formerly of Royal Oak, Mich., has moved to 1511 East Eight Mile Road, Hazel Park, Mich.

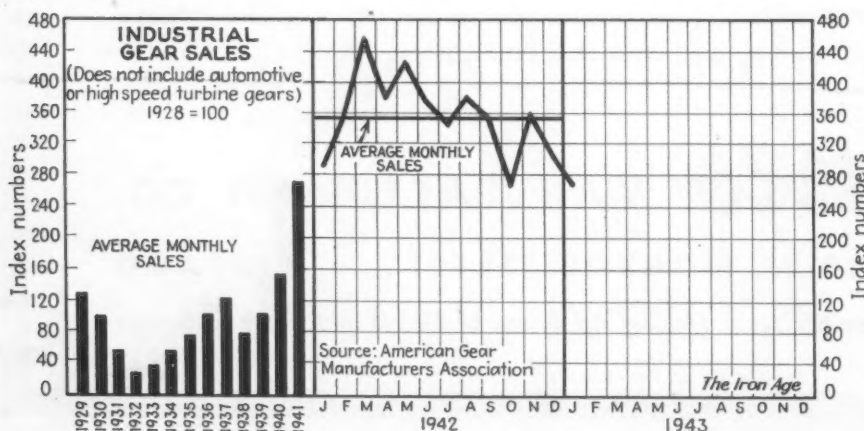
United Precision Products Co., Chicago, has moved to 3524 West Belmont Avenue so as to provide extra space for increased business. The company is a manufacturer of gages.

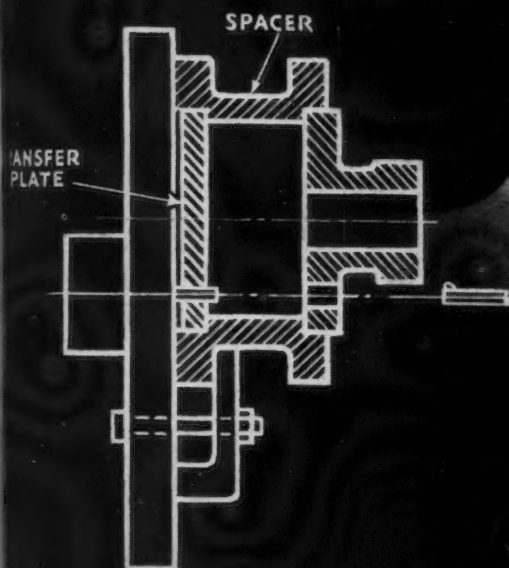
Norton Co., Worcester, Mass., has established a new department for the manufacture of steam turbines for escort ships, subchasers and other vessels. Herbert J. Griffing has been made head of the new department and will be assisted by A. S. Murray, planning engineer.

Langlois Gage Co. has entered into the field of manufacturing glass gages. Sales manager Sidney C. Gray said the firm had developed a new method of grinding and lapping a hardened processed glass and also has developed a plastic handle into which plug gage ends are inserted, simplifying replacement problems.

## Gear Sales Declined 11 Per Cent in January

... The gearing industry as represented by the members of the American Gear Manufacturers Association shows a decrease of 11 per cent in the business booked in January, 1943, as compared with December, 1942. The January index figure was 268 compared with 300 for December.





## ... transfer plate helps accurate center boring

*Information supplied by an Industrial Publication*

The problem of drilling a number of holes in a part on precise center distances is seldom simple. It is particularly complicated in mass production of parts where holes must register accurately.

The answer in one plant is what is known as a transfer plate. This is really a circular template, of any thickness over  $\frac{1}{8}$  inch, with uniform holes drilled on accurate centers. These holes fit a pin located at the exact center of a lathe face plate.

In mounting, the work is assembled to the transfer plate with a spacer between. The assembly is pinned

to the face plate through one of the holes in the transfer plate, and clamped tight.

A boring bar in the lathe tool rest can be used to bore a hole of any desired size in the work. The hole will be exactly in line with the pin, and consequently with the hole in the transfer plate.

Subsequent holes are bored by passing the pin through the remaining holes in the plate, until all are bored. When finished, every hole, regardless of diameter should be on the same center as the corresponding hole in the plate.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS. MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

**Climax Molybdenum Company**  
**500 Fifth Avenue • New York City**



# PRICES

## BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

		Seamless	Lap Weld,
		Cold Drawn	Hot Rolled
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft. over.....	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.....	65%

## CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago.....	\$54.80
6-in. and larger, del'd New York.....	52.20
6-in. and larger, Birmingham.....	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles.....	69.40
6-in. and larger f.o.b. cars, Seattle.....	71.20

Class "A" and gas pipe, \$3 extra; 4-in. pipe is \$3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is \$45 at Birmingham and \$53.80 delivered Chicago, \$59.40 at San Francisco and Los Angeles, and \$70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

## WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills  
(F.o.b. Pittsburgh only on wrought pipe)  
Base Price—\$200 per Net Ton

### Steel (Butt Weld)

	Black	Galv.
½ in. ....	63½	51
¾ in. ....	66½	55
1 to 3 in. ....	68½	57½

### Wrought Iron (Butt Weld)

½ in. ....	25	3½
¾ in. ....	30	10
1 and 1¼ in. ....	34	16
1½ in. ....	38	18½
2 in. ....	37½	18

### Steel (Lap Weld)

2 in. ....	61	49½
2½ and 3 in. ....	64	52½
3½ to 6 in. ....	66	54½

### Wrought Iron (Lap Weld)

2 in. ....	30½	12
2½ to 3½ in. ....	31½	14½
4 in. ....	33½	18
4½ to 8 in. ....	32½	17

### Steel (Butt, extra strong, plain ends)

	Black	Galv.
½ in. ....	61½	50½
¾ in. ....	65½	54½
1 to 3 in. ....	67	57

### Wrought Iron (Same as Above)

½ in. ....	25	6
¾ in. ....	31	12
1 to 2 in. ....	38	19½

### Steel (Lap, extra strong, plain ends)

2 in. ....	59	48½
2½ and 3 in. ....	63	52½
3½ to 6 in. ....	66½	56

### Wrought Iron (Same as Above)

2 in. ....	33½	15½
2½ to 4 in. ....	39	22½
4½ to 6 in. ....	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card. F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher on all butt weld.

## Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans, Domestic, 80%, per gross ton (carloads) .....\$135.00

## Electrolytic Manganese

99.9¼ plus, less ton lots, per lb. 42c.

## Spiegeleisen

Per Gross Ton Furnace  
Domestic, 19 to 21% .....\$36.00  
Domestic, 26 to 29% .....49.50

## Electric Ferrosilicon

(Per Gross Ton, Delivered Lump Size)  
50% (carload lots, bulk) .....\$74.50  
50% (ton lots, packed) .....87.00  
75% (carload lots, bulk) .....135.00  
75% (ton lots, packed) .....151.00

## Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 Si)  
F.o.b. Jackson, Ohio .....\$29.50\*  
Buffalo .....30.75\*  
For each additional 0.50% silicon add \$1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add \$1 a ton for 0.75% phosphorus or over.  
\*Official OPA price established June 24, 1941.

## Bessemer Ferrosilicon

Prices are \$1 a ton above Silvery Iron quotations of comparable analysis.

## Ferrochrome

(Per Lb., Contained Cr, Delivered Carlots, Lump Size, on Contract)

4 to 6 carbon .....	13.00c.
2 carbon .....	19.50c.
1 carbon .....	20.50c.
0.10 carbon .....	22.50c.
0.06 carbon .....	23.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

## Silico-Manganese

(Per Gross Ton, Delivered, Carloads, Bulk)

3 carbon .....	\$120.00*
2.50 carbon .....	125.00*
2 carbon .....	130.00*
1 carbon .....	140.00*

\*Spot prices are \$5 per ton higher.

## Other Ferroalloys

Ferrotungsten, per lb. contained W, del'd carload .....\$2.00  
Ferrovanadium, contract, per lb. contained V, del'd .....\$2.70 to \$2.90†  
Grainal, f.o.b. Bridgeville, Pa., freight allowed 100 lb. and over; maximum based on rate to St. Louis, Mo., per lb. ....45c.  
Bortam, f.o.b. Niagara Falls  
Ton lots, per lb. ....45c.  
Less ton lots, per lb. ....50c.  
Ferrocolumbium, per lb. contained Cb, f.o.b. Niagara Falls, N. Y., ton lots .....\$2.25†  
Ferrocobaltititanium, 15-18 Ti, 718 C, f.o.b. furnace, carload contract, net ton .....\$142.50  
Ferrocobaltititanium, 17-20 Ti, 3-5 C, f.o.b. furnace, carload contract, net ton .....\$157.50  
Ferrophosphorus, electric or blast furnace materials, carloads, f.o.b. Anniston, Ala., for 18% with \$3 unitage freight, equalized with Rockdale, Tenn., gross ton .....\$58.50  
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., \$3 unitage, freight equalized with Nashville, gross ton .....\$75.00  
Ferromolybdenum, per lb., Mo, f.o.b. furnace .....95c.  
Calcium molybdate, per lb., Mo, f.o.b. furnace .....80c.  
Molybdenum oxide briquettes 48-52 Mo, per lb. contained Mo, f.o.b. Langeloth, Pa. ....80c.  
Molybdenum oxide, in cans, per lb. contained Mo, f.o.b. Langeloth, and Washington, Pa. ....80c.  
Zirconium, 35-40%, contract basis, carloads in bulk or package, per lb. of alloy ....15c.  
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, per lb. ....7.50c.  
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, carlots freight allowed, per lb. 10.50c.

†Spot prices are 10c. per lb. of contained element higher.

## LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer, 51.50 .....	\$4.75
Old range, non-bessemer, 51.50 .....	4.60
Mesaba, bessemer, 51.50 .....	4.60
Mesaba, non-bessemer, 51.50 .....	4.45
High phosphorous, 51.50 .....	4.35

## COKE

### Furnace

Per Net Ton  
†Connellsville, prompt .....\$6.50\*

### Foundry

†Connellsville, prompt .....	\$7.25 to \$7.50
By-product, Chicago .....	\$12.25
By-product, New England .....	\$13.75
By-product, Newark .....	\$12.40 to \$12.95
By-product, Philadelphia .....	\$12.38
By-product, Cleveland .....	\$12.30
By-product, Cincinnati .....	\$11.75
By-product, Birmingham .....	\$8.50†
By-product, St. Louis .....	\$12.02
By-product, Buffalo .....	\$12.50

Maximum by-product coke prices established by OPA became effective Oct. 1, 1941.

\*Hand-drawn ovens using trucked coal are permitted to charge \$7.00 per net ton, plus usual transportation. Maximum beehive furnace coke prices established by OPA, Feb. 8, 1942. †F.o.b. oven.

## FLUORSPAR

	Per Net Ton
Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail .....	\$25.00
Domestic, f.o.b. Ohio River landing barges .....	25.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines .....	25.00

## REFRACTORIES

(F.o.b. Works)

### Fire Clay Brick

	Per 1000
Super-duty brick, St. Louis .....	\$64.60
First quality, Pa., Md., Ky., Mo., Ill. 51.30	
First quality, New Jersey .....	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill. 46.55	
Second quality, New Jersey .....	51.00
No. 1, Ohio .....	43.00
Ground fire clay, net ton .....	7.60

### Silica Brick

Pennsylvania & Birmingham .....	\$51.30
Chicago District .....	58.90
Silica cement, net ton (Eastern) ..	9.00

### Chrome Brick

	Per Net Ton
Standard, chemically bonded, Balt., Plymouth Meeting, Chester .....	\$54.00

### Magnesite Brick

Standard, Balt. and Chester .....	\$76.00
Chemically bonded, Baltimore .....	65.00

### Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads) .....	\$44.00
Domestic, f.o.b. Chewelah, Wash. (in bulk) .....	22.00